Research and Development Program 2.1

FY 1992-1993 Technology Base Program

United States
Army
Research
Institute

July 1991

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1a REPORT SECURITY CLASSIFICATION UNCLASSIFIED	1b RESTRICTIVE MARKINGS --
2a SECURITY CLASSIFICATION AUTHORITY --	3 DISTRIBUTION / AVAILABILITY OF REPORT APPROVED FOR PUBLIC RELEASE; DISTRIBUTION IS UNLIMITED.
2b DECLASSIFICATION / DOWNGRADING SCHEDULE --	
4 PERFORMING ORGANIZATION REPORT NUMBER(S) * ARI RESEARCH AND DEVELOPMENT PROGRAM 2.1	5 MONITORING ORGANIZATION REPORT NUMBER(S) --
6a NAME OF PERFORMING ORGANIZATION US ARMY RESEARCH INSTITUTE 6b OFFICE SYMBOL (If applicable) PERI-POP	7a NAME OF MONITORING ORGANIZATION --
6c ADDRESS (City, State, and ZIP Code) 5001 EISENHOWER AVENUE ALEXANDRIA, VA 22333-5600	7b ADDRESS (City, State, and ZIP Code) --
8a NAME OF FUNDING / SPONSORING ORGANIZATION US ARMY RESEARCH INSTITUTE FOR THE BEHAVIORAL AND SOCIAL SCIENCES 8b OFFICE SYMBOL (If applicable) PERI-POP	9 PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER --
8c ADDRESS (City, State, and ZIP Code) 5001 EISENHOWER AVENUE ALEXANDRIA, VA 22333-5600	10 SOURCE OF FUNDING NUMBERS PROGRAM ELEMENT NO. 65801 / PROJECT NO. MM15 / TASK NO. N/A / WORK UNIT ACCESSION NO N/A

11 TITLE (Include Security Classification)

FY 1992/1993 TECHNOLOGY BASE PROGRAM

12 PERSONAL AUTHOR(S)

ARI Corporate Authors

13a TYPE OF REPORT	13b TIME COVERED	14 DATE OF REPORT (Year, Month, Day)	15 PAGE COUNT
FINAL	FROM 1991 TO 1993	1991 JULY	178

16 SUPPLEMENTARY NOTATION

POINT OF CONTACT: JAMES A. BYNUM

17 COSATI CODES			18 SUBJECT TERMS (Continue on reverse if necessary and identify by block number)	
FIELD	GROUP	SUB-GROUP	TECHNOLOGY BASE	PERSONNEL
			RESEARCH AND DEVELOPMENT	TRAINING
			MANPOWER	HUMAN FACTORS

19 ABSTRACT (Continue on reverse if necessary and identify by block number)

This document presents ARI's technology base investment strategy and describes ARI's FY1992/1993 exploratory development (6.2) and advanced development (6.3a) efforts in support of the Army's Soldier-Oriented Research and Development in Personnel Performance and Training (SORD-PT) program. The SORD-PT program directly addresses four of the Army's six fundamental imperatives: quality soldiers and civilians; tough, realistic training; material modernization; and leader development.

20 DISTRIBUTION / AVAILABILITY OF ABSTRACT	21 ABSTRACT SECURITY CLASSIFICATION	
☒ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT ☐ DTIC USERS	UNCLASSIFIED	
22a NAME OF RESPONSIBLE INDIVIDUAL ROBERT T. ROOT	22b TELEPHONE (Include Area Code) (703) 274-8840	22c OFFICE SYMBOL PERI-POP

DD Form 1473, JUN 86 *Previous editions are obsolete.*

FY1992/FY1993 TECHNOLOGY BASE PROGRAM

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FY1992/FY1993 TECHNOLOGY BASE PROGRAM

INTRODUCTION

Everything we do to build the trained and ready Army of the future must have, as its primary focus, the men and women of the total Army.

General Carl E. Vuono, CSA
A Strategic Force for the 1990s and Beyond, January 1990

OVERVIEW

This document describes ARI's basic research (6.1), exploratory development (6.2) and advanced development (6.3A) efforts in support of the Army's Soldier-Oriented Research and Development in Personnel Performance and Training (SORD-PT) program. This program is executed by ARI under the supervision of the DA Deputy Chief of Staff for Personnel (DCSPER), who receives broad guidance from the Assistant Secretary of the Army for Research, Development and Acquisition (ASA(RDA)) and the Assistant Secretary of the Army for Manpower and Reserve Affairs (ASA(M&RA)).

This document describes ARI's FY1992 and FY1993 6.2 and 6.3A programs in detail. The basic research program is described briefly; it is documented more fully elsewhere. The full ARI program includes a research-based study and analysis program (6.5-funded) which is also documented elsewhere.

U. S. ARMY RESEARCH INSTITUTE FOR THE BEHAVIORAL AND SOCIAL SCIENCES

ARI, a field operating agency of the DA DCSPER, is the developing agency for a major portion of the DCSPER's SORD-PT program. As specified in AR 70-6 and AR 70-8, the DCSPER directs and monitors the planning, programming, budgeting and execution activities of ARI in the conduct of its comprehensive R&D program. The Commander of ARI, under the staff supervision of the Assistant DCSPER (ADCSPER), exercises management oversight responsibility for planning and execution of the ARI R&D program. As a developing agency, ARI's program is governed by DCSPER guidance and the provisions of AR 70-1, AR 70-6 and AR 70-8.

ARI TECHNOLOGY BASE INVESTMENT STRATEGY

ARMY IMPERATIVES:

The soldier is the basic element of land warfare. How does the Army recruit and retain quality people who can be trained to Army standards and are properly equipped to accomplish their mission. The Army's success in peace or war is, in large part, a function of its ability to address these factors.

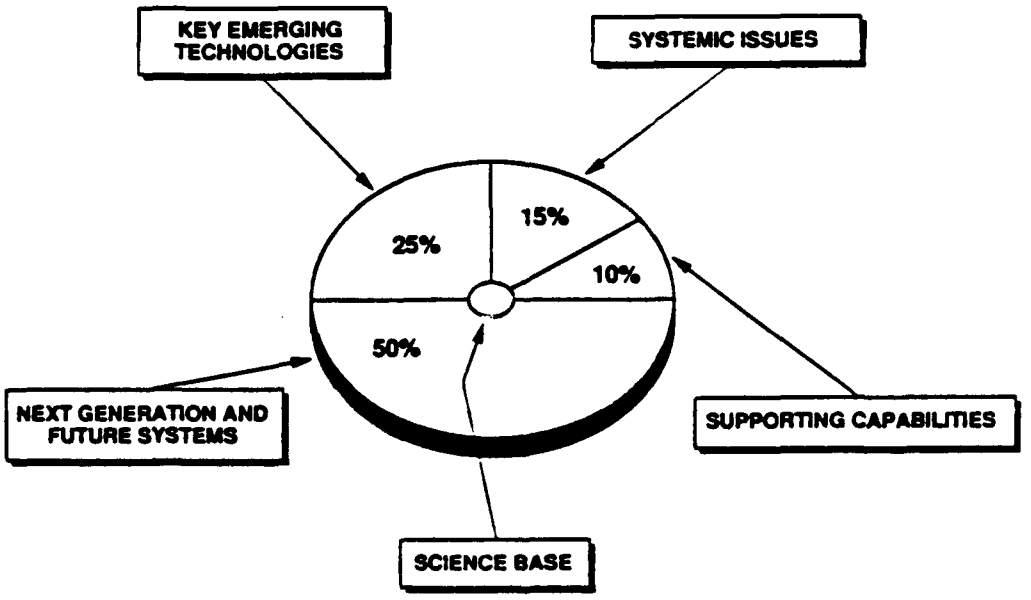
The Army's SORD-PT program directly addresses research and development concerns related to four of the Army's six fundamental imperatives: quality soldiers and civilians; tough, realistic training; materiel modernization; and leader development. (Starting in FY92, through its research-based study and analysis program, it will directly support other Army organizations in the remaining imperatives, warfighting doctrine and optimal force structure.)

ARMY TECHNOLOGY BASE MASTER PLAN (ATBMP) GUIDANCE

The Army's Technology Base Investment Strategy (TBIS) partitions the technology base program into four descriptive domains, as shown in Figure 1. The percentages shown in the figure "depict a reasonable goal for distributing funds in each of the four descriptive domains based upon the best judgment of the Army technology base leadership." (page I-18, ATBMP, Nov 1990).

Figure 1

TECHNOLOGY BASE RESOURCE DISTRIBUTION



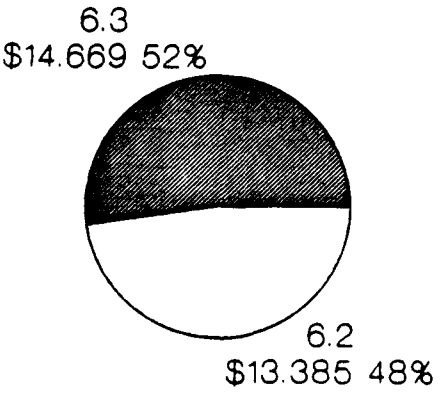
As part of its investment strategy, the Army is focusing on priority efforts by establishing a set of science and technology objectives (STO) - "a specific, measurable, major technology advancement to be achieved by a specific fiscal year consistent with the funding available..." The nine ARI STOs are given in Appendix A. In FY91, 30 of 71 R&D tasks, or 42% of the program, were directly supporting STOs. Funding for these tasks amounted to approximately $18 million, 55% of FY91 6.2 and 6.3A funding. For FY92, approximately the same percent of the program will be covered by STOs.

ARI FY92 PROGRAM

The ARI exploratory development and advanced development programs are an integral part of the domain of **Systemic Issues** (which collectively with the Army's other Systemic Issues account for 15% of the Army's technology base funds). ARI's FY92 exploratory development (6.2) and advanced development (6.3) funding is shown in Figure 2.[1] The exploratory development program includes an Innovative Ideas from Industry (I^3) Program to be initiated in FY92.

FIGURE 2

FY92 PROGRAM



Excludes ARI Admin & Mgmt Asst

[1] 24 May 1991 funding figures.

PROGRAM DEVELOPMENT

GENERAL

ARI's Soldier-Oriented R&D in Personnel Performance and Training (SORD-PT) addresses the full range of systemic soldier issues related to manpower, personnel and training in an Army-wide Research, Development, Test and Evaluation (RDT&E) program. This R&D program is carried out with fiscal resources from four funding categories: Research (6.1), exploratory development (6.2), advanced development (6.3A), and study and analysis (6.5).

The total program is developed to exploit technology ("Technology Push") for improved soldier performance, as well as to reflect the needs of soldiers and leaders in the field ("Requirements Pull"). (See Figure 3.)

"Technology Push" and "Requirements Pull" are integrated with guidance from the Deputy Chief of Staff for Personnel (DCSPER) into a draft program covering the Budget Fiscal Year (BFY) through the Program Objective Memorandum (POM). The ARI Commander and Technical Director then present the program to the SORD-PT General Officer Steering Committee (GOSC) which provides advice to the DCSPER who approves the BFY - POM technology base program (6.2 and 6.3A) and the BFY/TFY study and analysis program (6.5).

The DCSPER is the proponent for all research and exploratory development efforts. Every advanced development effort requires a proponent/sponsor before the 6.3A task is initiated. In addition, for each 6.3A task there is a Memorandum of Agreement (MOA) that spells out the R&D responsibilities of ARI and the implementation responsibilities of the proponent/sponsor.

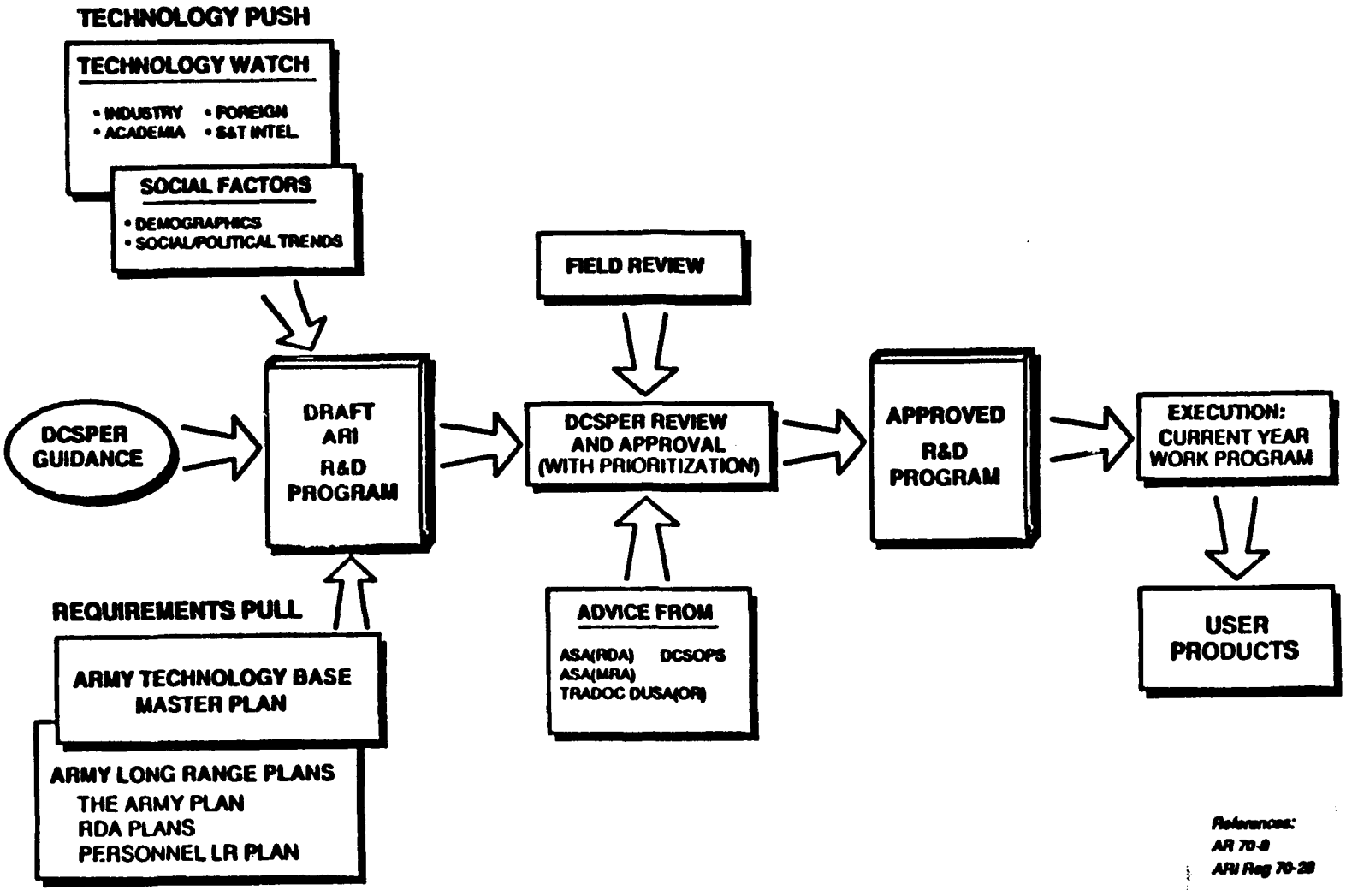
For the research and exploratory development programs, priorities are established by the ARI Commander and Technical Director and approved by the DCSPER, with advice from the SORD-PT GOSC.

The advanced development program is reviewed in the field by sponsors and major commands. Each reviewing command is asked to rank-order the advanced development tasks comprising the program. The various responses are consolidated at ARI and presented to the DCSPER for approval.

SPECIFIC

Each laboratory through its technical areas and field units and the ARI Office of Basic Research are responsible for maintaining up-to-date descriptive information and resource data

FIGURE 3
ARI PROGRAM DEVELOPMENT



References:
AR 70-8
ARI Reg 70-28

APR 91

for each R&D task (work package) and work unit for which it is responsible. The Office of Basic Research also prepares a document covering its basic research and Independent Laboratory In-House Research (ILIR) programs. Using the descriptive information and resource data available for each task, the Plans, Programs and Operations (PP&O) Office prepares documents for program review and prioritization (See Figure 4).

The Science and Technology Plan covers the ARI advanced development program from the Budget Fiscal Year (BFY) through the POM-years. To ensure that ARI addresses the Army's most critical soldier problems, field priorities for the 6.3A tasks are obtained from major proponents and ARSTAF agencies: ODCSPER, TRADOC, ASA(M&RA), DCSOPS, and ASA(RDA).

These offices also provide members to the SORD-PT General Officer Steering Committee (GOSC). This committee meets to review and recommend to the DCSPER a final, consolidated rank-ordering of the tasks comprising the advanced development program. The GOSC reviews the exploratory development priorities established internally for the BFY, reflecting ARI management judgement of the relative importance of the technologies that must be developed to support future 6.3A efforts. The GOSC also reviews the planned BFY research-based studies and analysis program.

Following GOSC review, the DCSPER approves the exploratory development, advanced development, and research-based studies and analysis programs for the BFY.

The laboratories amend R&D program plans to conform to DCSPER guidance. The laboratories and the Basic Research Office ensure that the information they have entered into the ARI-MIS reflects priorities established and changes requested by the DCSPER. The ARI 6.2 and 6.3A programs are then documented in the BFY/TFY Research and Development document. (The 6.1 and research-based study and analysis programs are documented separately.)

The Commander and the Technical Director review and approve the draft document. After required changes are made, the final document is submitted to the DCSPER for approval.

During the fourth quarter of the CFY, PP&O provides the Financial Management Office (FMO) the fiscal data necessary to prepare Funding Authorization Documents (FAD) and Fund Citations.

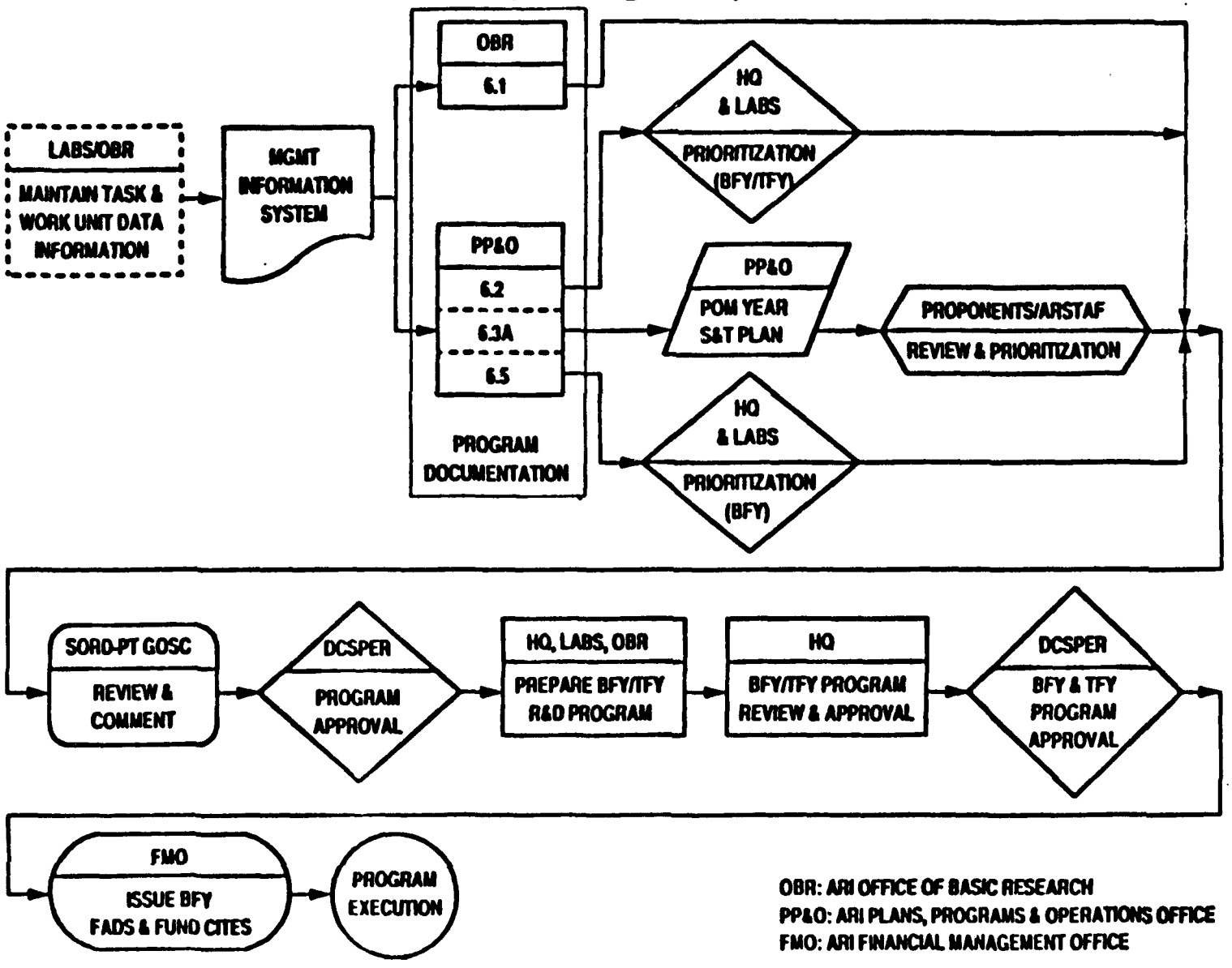
PROGRAM EXECUTION

The DCSPER is the sponsor of ARI's basic research and exploratory development efforts. The research program extends the frontiers of scientific knowledge in the behavioral and social sciences. The exploratory development program is directed

FIGURE 4

PROGRAM DEVELOPMENT

(ARI Reg 70-28)



OBR: ARI OFFICE OF BASIC RESEARCH
PP&O: ARI PLANS, PROGRAMS & OPERATIONS OFFICE
FMO: ARI FINANCIAL MANAGEMENT OFFICE

toward the exploitation of technological opportunities for the solution of systemic soldier-related problems and issues.

Successful exploratory development efforts are transitioned to 6.3A funding. Advanced development efforts are sponsored by Army staff agencies and major commands, primarily the ODCSPER and the Training and Doctrine Command (TRADOC). (A sponsor who is in a position to ensure the effective implementation at an Army-wide level is called a proponent.) A sponsoring organization is responsible for:

* assisting in the strategic planning of a new SORD-PT effort.

* supporting the execution of the R&D, at times fiscal resources and/or troops to serve as research subjects.

* staying abreast of R&D progress.

* implementing successful products of the SORD-PT program.

For all advanced development tasks, a Memorandum of Agreement (MOA) is negotiated between the proponent/sponsor and ARI and serves as a requirement document for the effort. The MOA is an agreement on the part of ARI to commit R&D resources for the execution of the effort and an agreement on the part of the proponent/sponsor to implement the results of a successful R&D effort.

BASIC RESEARCH (6.1) PROGRAM

The following page provides a synopsis of the ARI basic research program.

ARI BASIC RESEARCH (6.1) PROGRAM

PROGRAM OBJECTIVE:

To add new knowledge and generalizable principles in the behavioral sciences and its many subdisciplines, providing the basis for innovative technological solutions to unresolved people-related problems.

APPROACH:

A portion of this program is conducted in-house. However, most the program is conducted under contract by behavioral scientists in universities. A portion of available funding is earmarked for meritorious proposals from historically black colleges and from other minority institutions.

Innovative research ideas are solicited from academia through a broad agency announcement (BAA). Research programs range from one to five years; but, with current funding limitations long term efforts are rare. Single-investigator and collaborative research efforts are acceptable, as are multidisciplinary approaches to a central problem. Collaborative efforts may involve researchers at a single institution or in cooperating institutions.

TECHNOLOGY OBJECTIVES:

The ARI FY92/93 basic research program (described in more detail in FY1992/1993 Basic Research Program) will support a full-range of in-house and contract efforts, focusing on the following:

Group Performance Processes and Measurement: Research topics in this area include: group problem solving and decision making, theoretical approaches to human resource modeling and performance prediction, and leadership and motivation of performance.

Learning and Cognitive Foundations for Advanced Training Technology: Research topics in this area include: analysis of rapid problem solving, and individual difference factors in learning and retention of high-demand tasks.

FUNDING:	FY92	FY93
6.1	3506	3649

POINT OF CONTACT:

ARI Office of Basic Research, PERI-BR

SECTION I

Exploratory Development (6.2) Program

Innovative Ideas from Industry (I^3) Program

PROGRAM AREA 1: Structuring and Equipping the Force

PROGRAM AREA 2: Manning and Leading the Force

PROGRAM AREA 3: Training for Combat Effectiveness

INNOVATIVE IDEAS FROM INDUSTRY (I^3) PROGRAM

PROGRAM OBJECTIVE:

To stimulate faster development of innovative ideas for making significant improvements in personnel and training performance.

APPROACH:

Innovative research and development ideas will be solicited from the private sector for the development and application of new technologies in the behavioral and social sciences (and related disciplines) and to accelerate their transition to utilization.

This exploratory development (6.2) program will be initiated in FY92. Ideas will be solicited from industry through a broad agency announcement (BAA). Preference will be given to short-term (1-2 year) efforts demonstrating high-risk/high-gain technology or novel and "leading edge" applications.

TECHNOLOGY OBJECTIVES:

The I^3 program considers all areas of manpower, personnel and training with an FY92/FY93 focus in the following five areas:

Technologies for Rapid Surveys: Technology that will exploit recent advances in automation and software, as well as sampling theory, item construction, communication and statistics.

Team Perfect Performance: Technology for achieving and measuring error-free performance in teams and crews.

Training for Mission Rehearsal: Engagement simulation training methods that will provide the basis for ensuring the cost-effective utilization of major recent advances in computer and graphics technology (e.g., networking and "virtual reality").

Technology for Analyzing Unit Tactical Performance: Application of advanced analytic techniques, such as chaos and catastrophe theories and the concept of neural networks, to maximize the utility of the data from instrumented training conducted at the National Training Center.

Models for the Redesign of Organizations: Technology for the application of advances in organizational and management theory to the design and "downsizing" of Army organizations.

POINT OF CONTACT:

ARI Office of Basic Research, PERI-BR

Exploratory Development

PROGRAM AREA 1: Structuring and Equipping the Force

1102: CONTROLLING EXCESSIVE WORKLOAD IN ARMY FORCE DEVELOPMENT AND SYSTEM ACQUISITION PROCESSES

1211: IMPROVING CREW AND TEAM LEVEL PERFORMANCE IN AVIATION AND GROUND OPERATIONS

1212: SOLDIER DECISION PROCESS ERRORS IN FIRE SUPPORT INTEGRATION

1213: CONCEPTS FOR EXTENDING THE PERFORMANCE OF MILITARY SYSTEMS IN COMBAT

1215: AIR DEFENSE ARTILLERY C3I AND TARGET IDENTIFICATION

1301: IMPROVED METHODS FOR BATTLE COMMAND TRAINING

1303: ENHANCED TECHNIQUES FOR COMMAND STAFF PERFORMANCE

1306: INTELLIGENCE AND ELECTRONIC WARFARE SOLDIER PERFORMANCE FOR BATTLEFIELDS OF THE FUTURE

1308: METHODS FOR EVALUATING C2 PROCESSES AND PERFORMANCE

1102: CONTROLLING EXCESSIVE WORKLOAD IN ARMY FORCE DEVELOPMENT AND SYSTEM ACQUISITION PROCESSES

TECHNOLOGICAL OPPORTUNITY:

The absence of validated techniques for predicting individual operator and crew workload in Army systems has limited the Army's capability to conduct meaningful front end analyses early in the design of new and improved systems. Historically, operator and crew workload issues have significantly impacted the cost and operational effectiveness of such systems. However, such issues have generally been identified only after system development and fielding.

TECHNOLOGICAL OBJECTIVE:

To develop reliable and valid methods which (1) forecast, for a given design, the impact of operator mental workload on the performance of new Army systems, (2) allocate workload-imposing tasks among soldier, hardware, and software components of systems and assess the influence of workload factors on the organizational design of Army units, and (3) establish procedures for the selection, classification, and training of soldiers to effectively cope with operator workload in operational situations.

TECHNOLOGICAL IMPACT:

The Army's continued modernization with declining resources can ill afford developmental risk. Yet, in more complex weapon systems, crew workload tolerance becomes an increasingly critical risk in system design and operational effectiveness. Validated workload prediction tools will allow the Army's combat and materiel developers to identify and resolve critical soldier-system incompatibilities early in the weapons system design process, thus avoiding costly design changes. These methods will also identify strategies for tough training to increase soldier workload tolerance under varying battlefield conditions.

6.2 PRIORITY: 6 OF 25

FUNDING:	FY92	FY93	**END DATE:** FY92
6.2	380	0	

PERFORMING ELEMENT:

FORT BLISS FIELD UNIT
SYSTEMS RESEARCH LABORATORY

PROGRESS:

Published the results of a comprehensive review and evaluation of Operational Workload (OWL) assessment methods	FY89
Completed Version 2.0 of the systematic organizational design (SORD) software and a draft user's manual	FY90
Completed an in-house workload analysis of the Stingray system during a concept evaluation field test	FY90
Published a primer on the SORD methodology	FY90
Conducted a field test of SORD Version 2.0 at eight TRADOC schools and centers, and completed SORD Version 2.5	FY91
Published the Crew Requirements Definition System (CRDS) software and user's manual as an ARI Research Product	FY91
Published the SORD Version 2.5 software and user's manual	FY91
Published the Operator Workload Knowledge-Based Expert System Tool OWLKNEST software and user's Handbook for Operating the OWLKNEST Technology (HOOT)	FY91
Published an ARI Technical Report based on the workload analysis of the Stingray system	FY91

FY92/FY93 MILESTONES:

Evaluation of current and potential force design techniques and procedures	FY92
Complete the development of SORD Versions 3.0	FY92

PROJECTED TECHNOLOGY PRODUCTS:

SORD version 3.5 software and user's manual	FY92
Comparative evaluation of alternative techniques for predicting operator workload and performance	FY92

1211: IMPROVING CREW AND TEAM LEVEL PERFORMANCE IN AVIATION AND GROUND OPERATIONS

TECHNOLOGICAL OPPORTUNITY:

The objective of this exploratory development project is to (1) identify and isolate specific human error factors which significantly degrade crew-team coordination and performance; (2) provide proof-of-concept demonstrations of selection, training, and evaluation technologies which are effective in improving performance at the crew-team level; and (3) refine the basic methods and taxonomies for investigating, documenting, and predicting crew and team level performance in aviation and ground combat systems to improve soldier-materiel system design.

TECHNOLOGICAL OBJECTIVE:

Project objectives are (1) to identify human error factors prevalent in Army aviation and ground operation accidents, and to identify promising near-term strategies for reducing these accident causes through training, leadership, selection and classification, and materiel countermeasures; (2) to develop and validate improved procedures for investigating and documenting human error factors in Army aviation and ground weapon system operations (FY89-90); and (3) to demonstrate and evaluate prototype materiel and other countermeasures for improving the safety of Army aviation and ground weapon system operations.

TECHNOLOGICAL IMPACT:

70 to 80% of Army Class A aviation accidents are described by the Army Safety Center as being due to "pilot error." To reduce the rate of these accidents requires that the root causes of "pilot error" be identified beyond assuming "willful negligence." A further behavioral explanation of these error sources would enable pilot leadership, policy, or organization changes to reduce fractionally the $250M/year loss in property and soldier resources.

6.2 PRIORITY: 8 OF 25

FUNDING:	FY92	FY93	**END DATE:** FY97
6.2	818	704	

PERFORMING ELEMENT:

FORT RUCKER (AVIATION RESEARCH AND DEVELOPMENT ACTIVITY)
SYSTEMS RESEARCH LABORATORY

PROGRESS:

Trial evaluation of placing ARI staff psychologists on USASC Accident Investigation Boards	FY87
Safety R&D Program Identified	FY88
Prototype rating scales evaluation for use in identifying task characteristics and ability requirements in accident investigation	FY89
Safety R&D research team established at ARIARDA, Fort Rucker	FY89

FY92/93 MILESTONES:

Expansion of aircrew coordination and NVG training scenarios to AH-1 and AH-64 weapon system simulators	FY92
Prediction of pilot error behavior (Operational Unit) using expanded version of multitrack test battery	FY92
Expansion of emergency procedures training development to ground-based weapon systems	FY93

PROJECTED TECHNOLOGY PRODUCTS:

Prototype AH-1 and AH-64 weapons simulator scenarios for evaluating aircrew resource management (Tandem Seating)	FY92
Refined selection criteria for Army Aviation Candidates (High-risk Aviator Profiles)	FY92
Aircrew workload models for assessing aircrew coordination and pilot error	FY93
Prototype demonstration of selected cockpit technologies for reducing crew-level error in Army aviation	FY93
Prototype ground combat system simulator scenarios for evaluating multi-crew coordination and safety performance	FY93
Diagnostic and prescriptive methodologies for investigating, documenting, and eliminating or controlling human error factors in Army aviation and ground weapon system operations	FY97

1212: SOLDIER DECISION PROCESS ERRORS IN FIRE SUPPORT INTEGRATION

TECHNOLOGICAL OPPORTUNITY:

The introduction of automated decision support systems for use by command and control (C2) staffs and field artillery system crews is having numerous effects upon the Army. Examples include decentralization of decision making, potential reduction in the size of crews and staffs, and revisions in organizational structures. The result is a reduction in battlefield effectiveness until means are worked out for making optimal use of the new support systems. Field artillery, whose proper utilization and effectiveness is dependent upon an efficiently functioning C2 process, is particularly affected. Fire support is most effective when it is fully integrated into the operational plan and properly managed through efficient C2 processes during execution of the plan.

TECHNOLOGICAL OBJECTIVE:

To develop methods to identify and investigate those soldier and computer interface attributes that contribute to soldier error in computer-aided decision making. Particularly relevant to field artillery, this research will use a computer-based battle simulation facility to identify soldier errors in fire support planning at battalion and brigade levels.

TECHNOLOGICAL IMPACT:

This research will lead to a better understanding of how decision making errors in fire support planning and integration during the C2 process contribute to decreases in fire support effectiveness. This will lead to improved integration of fire support into battlefield operations. Extended to other battlefield systems, the results will lead to soldier-computer interface designs that produce more reliable systems needing fewer soldiers for error detection and correction.

6.2 PRIORITY: 23 OF 25

FUNDING:	FY92	FY93	**END DATE:** FY97
6.2	388	514	

PERFORMING ELEMENT:

FORT SILL FIELD UNIT
SYSTEMS RESEARCH LABORATORY

PROGRESS:

Institutional Fire Control System Trainer (IFCST) data collection and report generation capabilities demonstrated	FY91

FY92/93 MILESTONES:

Assess Chief of Section (COS) performance with IFCST	FY92
Develop model of advanced towed howitzer crew requirements and estimate 105mm to 155mm conversion potential	FY92
Develop and test Platoon Operations Center (POC) staff aids	FY93

PROJECTED TECHNOLOGY PRODUCTS:

Measures for assessing COS performance using the IFCST	FY92
Computer model for assessing advanced towed howitzer crew requirements	FY92
Software for use with Janus (Battlelab) in collecting staff performance measures with respect to planning and directing indirect fires	FY93
Measures for demonstrating improved POC performance	FY93
Model and taxonomy of FA staff performance	FY94
Data base of FA staff performance and decision process errors	FY96
Diagnostic and prescriptive model to identify, investigate, and control those soldier-computer interface factors which contribute to soldier error in computer-aided decision making	FY97

1213: CONCEPTS FOR EXTENDING THE PERFORMANCE OF MILITARY SYSTEMS IN COMBAT

TECHNOLOGICAL OPPORTUNITY:

Ongoing development of powerful yet accessible soldier-system performance models with data bases enables system effectiveness to be related to soldier resources. The work associated with development of TRADOC's Concept Based Requirements System (CBRS) and doctrine development processes addresses the linkage between soldier and mission performance. The opportunity exists to create concepts for extending the performance of military systems at the mission level through the optimum design of combat units.

TECHNOLOGICAL OBJECTIVE:

To develop and evaluate methods and strategies for designing combat units that extend with a minimum of cost the combat performance of manned military systems.

TECHNOLOGICAL IMPACT:

The Army's likely missions will originate from an increasingly divergent range of situations, to which a given combat force must be able to respond quickly. Operations such as Desert Shield illustrate the probable circumstance in the future where CONUS-based units, not tailored for specific missions, will be the source of combat power drawn upon. Optimized unit design procedures will maximize the combat readiness and capability obtainable with a minimum of soldiers and system resources.

6.2 PRIORITY: 24 OF 25

FUNDING:	FY92	FY93	**END DATE:** FY97
6.2	339	371	

PERFORMING ELEMENT:

MANNED SYSTEMS GROUP
SYSTEMS RESEARCH LABORATORY

PROGRESS:

Examined initial concepts using fire support units supplied with Advanced Field Artillery System (AFAS) as a testbed	FY91
Developed an approach for integrating Systematic Organizational Design (SORD) and Blueprint of the Battlefield to provide basis for assessing alternative unit designs	FY91

FY92/93 MILESTONES:

Develop a topology of unit models along branch and other dimensions	FY92
Identify manpower, personnel, and training factors that influence unit performance	FY93

PROJECTED TECHNOLOGY PRODUCTS:

Model for relating soldier and system factors to unit performance	FY94
Proven unit design methodology for extending combat performance	FY97

1215: AIR DEFENSE ARTILLERY C3I AND TARGET IDENTIFICATION

TECHNOLOGICAL OPPORTUNITY:

Recent advances in sensor and message processing technology have improved the quality of information which can be rapidly transmitted in a command, control, communication, and intelligence (C3I) net. Real potential exists to overload the Air Defense Artillery (ADA) crew with excess or irrelevant target data. The proposed research will harness these advances by integrating them with the soldier's ability to process and interpret them.

TECHNOLOGICAL OBJECTIVE:

To increase air defense combat effectiveness by improving performance for (1) automated force operations in ADA C3I and (2) Forward Area Air Defense (FAAD) C3I engagement performance, and identifying command and control decision-making requirements including verification of hostiles during engagement operations.

TECHNOLOGICAL IMPACT:

Results of this research will ensure full air defense artillery integration with the AirLand Battle Future doctrine by helping to develop a C3I which maximizes the synthesis of reliable, accurate information and minimizes casualties from friendly fire.

6.2 PRIORITY: TBD

FUNDING:	FY92	FY93	**END DATE:** FY97
6.2	0	411	

PERFORMING ELEMENT:

FORT BLISS FIELD UNIT
SYSTEMS RESEARCH LABORATORY

PROGRESS: New Start

FY92/FY93 MILESTONES:

Analyze information and task requirements for operator monitoring of automatic air defense engagement operations	FY93
Complete information and task requirement analyses of manual High-to-Medium Altitude Air Defense (HIMAD) and FAAD Tactical Operations Center (TOC) force operations	FY93
Conduct baseline research of situation analyses and engagement decisions by FAAD leaders in decentralized operations	FY93
Interview HIMAD and FAAD Battalion staff personnel on information and task requirements for manual force operations	FY93
Plan investigation of Information Coordination Central (ICC) Command and Control (C2) of Patriot and Hawk engagement operations	FY93

PROJECTED TECHNOLOGY PRODUCTS:

Analysis of task and information requirements during computer-assisted HIMAD TOC force operations	FY94
Evaluation of manual and computer-assisted force operations in HIMAD TOC	FY95
Workload-based requirements for up-grade in Patriot ICC engagement operations in support of objective ADA C3I	FY95
Recommendations of decision-aid formats in support of HIMAD force operations	FY96
Evaluation of manual force operations at FAAD TOC as a function of mission	FY96
Recommendations of decision-aid formats in support of FAAD force operations	FY97
Analysis of battlefield information requirements for manual and computer-assisted force operations at FAAD TOC	FY97

1301: IMPROVED METHODS FOR BATTLE COMMAND TRAINING

TECHNOLOGICAL OPPORTUNITY:

Experimental evidence and lessons learned from training exercises have increasingly focused attention on the decision analytic approach to staff problem solving prescribed by Army doctrine and upon the requirement for the commander and staff to visualize and anticipate events. Theoretical developments in problem solving and group decision making suggest that current practices may profit from revisions in procedure, particularly under conditions of time stress and uncertainty. Research must be conducted to determine which procedures should be changed and how best to train the revised procedures.

TECHNOLOGICAL OBJECTIVE:

To improve battle command staff efficiency and effectiveness by (1) developing an understanding of small group problem-solving processes and (2) identifying effective approaches for battle command training of individuals and small groups. To develop and test prototype methods improving command group readiness training especially within the Army's Battle Command Training Program (BCTP) and the Tactical Commanders Development Program (TCDP).

TECHNOLOGICAL IMPACT:

Advances in training technology coupled with reductions in training overhead costs will permit the Army to conduct more frequent and tailored training exercises for its command staff elements, thereby increasing Army readiness and combat effectiveness.

6.2 PRIORITY: 15 OF 25

FUNDING:	FY92	FY93	**END DATE:** FY94
6.2	272	353	

PERFORMING ELEMENT:

FORT LEAVENWORTH FIELD UNIT
SYSTEMS RESEARCH LABORATORY

PROGRESS:

Objectively scorable group problem-solving exercise - VARWARS Problem	FY88
VARWARS Process Scales User's Guide - guide for evaluating problem solving process	FY88
VARWARS User's Manual - Guide for administration and scoring of VARWARS problem	FY88
Standardized group problem solving exercise	FY89
Identification of tactical messages; criteria for realism of messages in command post exercises	FY90
Impact and effectiveness analysis of Tactical Commander's Development Course (TCDC) of CGSC	FY91

FY92/93 MILESTONES:

Guidelines for After Action Reviews in BCTP	FY92
Recommendations for staff problem solving	FY92

PROJECTED TECHNOLOGY PRODUCTS:

Staff problem solving procedures	FY92
Recommendations for staff group training, classroom and sustainment training	FY94

1303: ENHANCED TECHNIQUES FOR COMMAND STAFF PERFORMANCE

TECHNOLOGICAL OPPORTUNITY:

Advances in the study of human performance, cognition, and group interaction provide the opportunities to enhance command and control (C2) by bringing the soldier to the forefront of consideration in combat developments. Staffs are known to take short cuts leading to incompletely considered plans, with few contingency options, because of individual and group tendencies and situational factors. The Army must take full opportunity to discover the roles and relative influences of the soldier, which are the mainstay for relying on C2 for battlefield success.

TECHNOLOGICAL OBJECTIVE:

The research will identify the complex, mental abilities required of effective commanders and staffs. These cognitive requirements will be used to define procedures that are flexible to the demands of the tactical environment, yet sufficiently structured to promote efficient coordination. The new knowledge procedures and the technologies generated from this research will improve command and control operations and survivability on the AirLand Battlefield by transitioning user-designed and -tested concepts to doctrinal and materiel proponents.

TECHNOLOGICAL IMPACT:

Successful integration of improved staff procedures, C2 technology, soldier quality, and organizational structure will ensure that future tactical commanders are supported with an effective, efficient, and resilient system for planning and executing combat operations.

6.2 PRIORITY: 19 OF 25

FUNDING:	FY92	FY93	**END DATE:** FY96
6.2	285	367	

PERFORMING ELEMENT:

FORT LEAVENWORTH FIELD UNIT
SYSTEMS RESEARCH LABORATORY

PROGRESS: New Start

FY92/93 MILESTONES:

Initial situation understanding framework	FY92
Techniques for improving situation understanding	FY92
Testing of improved situation understanding techniques	FY93

PROJECTED TECHNOLOGY PRODUCTS:

Cognitive framework of tactical situation understanding	FY92
Soldier-centered concepts for assessment enhancements	FY93
Command and staff skills for rapid battle execution	FY95
Tactical planning and execution knowledge-base Framework	FY96
User-based knowledge procedures and technologies for use in tactical command staff environments	FY96

1306: INTELLIGENCE AND ELECTRONIC WARFARE SOLDIER PERFORMANCE FOR BATTLEFIELDS OF THE FUTURE

TECHNOLOGICAL OPPORTUNITY:

In the future, military intelligence (MI) soldiers will not be able to adequately support the command staff unless they are able to perform in a rapidly changing, technologically complex environment. The Army Intelligence and Electronic Warfare Modernization Plan has developed an acquisition strategy to ensure that MI can meet these demands. With the acquisition of updated IEW collection and processing systems, existing collection, processing, and analysis strategies must be modified and new strategies must be explored in order to take advantage of these new systems and make the systems responsive to soldier capabilities.

TECHNOLOGICAL OBJECTIVE:

Develop cognitive information processing and inferencing strategies which expedite the collection, extraction, and delivery of battlefield information, and enhance the analyses necessary for predictive intelligence.

TECHNOLOGICAL IMPACT:

Improved strategies to optimize the use of intelligence assets to enhance coverage of enemy activities and increase analytical proficiency will result in a powerful force multiplier.

6.2 PRIORITY: 4 OF 25

FUNDING:	FY92	FY93	**END DATE:** FY96
6.2	419	297	

PERFORMING ELEMENT:

FORT HUACHUCA FIELD UNIT
SYSTEMS RESEARCH LABORATORY

PROGRESS:

Established analytical process required for deception planning	FY88
Tested knowledge elicitation methods to generate collection management and all-source analysis strategies	FY89
Developed method to establish MI systems requirements in terms of KSA profiles	FY90
Determined utility of Pathfinder method to capture individual differences in clustering information	FY91

FY92/93 MILESTONES:

Collect data on strategies analysts use in processing information	FY92
Derive inferencing and processing approaches which reduce information processing errors	FY93

PROJECTED TECHNOLOGY PRODUCTS:

Analytical Strategies for predicting enemy intentions	FY92
Job aid for reducing analytical errors in predictive intelligence	FY93
Strategies for fusing divergent information sources	FY94
Job aid for integrating multi-source information	FY95
Graphic analysis and dissemination techniques	FY96
Inferencing strategies to expedite collection, extraction and delivery of battlefield information	FY96

1308: METHODS FOR EVALUATING C2 PROCESSES AND PERFORMANCE

TECHNOLOGICAL OPPORTUNITY:

The Army is attempting to standardize capstone training for division and corps Headquarters. Further, a mechanism has been established to archive data from such training exercises. A technology for providing improved diagnostic feedback and for capturing performance data has been developed by ARI, known as Army Command and Control Evaluation System (ACCES). The pending availability of such data makes it possible in theory to construct an analytical model of command and control which can be used to predict the impact on performance of proposed changes in command post staffing, equipment, and procedures.

TECHNOLOGICAL OBJECTIVE:

To develop and implement a prototype theoretical framework of a command and control performance data base and an analytic model of staff performance to support the development of lessons learned and the objective evaluation of Command and Control (C2) hardware and software systems, staff procedures, and organizations associated with the Army Tactical Command and Control System (ATCCS).

TECHNOLOGICAL IMPACT:

This development will provide the Army with refined concepts for an objective method for assessing C2 effectiveness in division and corps exercises and for assessing the benefit of proposed new doctrine and systems for C2.

6.2 PRIORITY: 3 OF 25

FUNDING:	FY92	FY93	**END DATE:** FY95
6.2	182	221	

PERFORMING ELEMENT:

FORT LEAVENWORTH FIELD UNIT
SYSTEMS RESEARCH LABORATORY

PROGRESS:

Preliminary ACCES Version	FY88
Preliminary design of Battle Command Training Program-Center for Army Lessons Learned (BCTP-CALL) Lessons Learned database	FY89
Summary of ACCES Application Results	FY90
Prototype ACCES Element Database	FY91
Review of ACCES measurement methodology	FY91
Revised ACCES variable definitions	FY91

FY92/93 MILESTONES:

Baseline data for division C2 processes	FY92
Recommendations for changes in ACCES procedures	FY92
A prototype C2 performance data depository and accessing system to retain and make available C2 data	FY92
C2 analytic model draft report	FY93
Recommendations for changes in ACCES procedures	FY93

PROJECTED TECHNOLOGY PRODUCTS:

User friendly ACCES application system	FY93
Database prototype for multimedia C2 performance measures	FY94
Analytic model for predicting C2 performance	FY95

Exploratory Development

PROGRAM AREA 2: Manning and Leading the Force

2108: OFFICER CAREER DEVELOPMENT TECHNOLOGIES

2109: TECHNOLOGICAL APPLICATIONS TO IMPROVE RECRUITING

2211: ALTERNATIVE SELECTION AND EVALUATION TECHNIQUES

2218: DETERMINING MINIMAL ENTRY QUALIFICATIONS

2304: LONG-TERM EFFECTS OF MILITARY SERVICE: OFFICER CAREER PATTERNS

2306: SOCIO-PSYCHOLOGICAL BENEFITS OF ARMY SERVICE

2405: FACTORS INFLUENCING LEADERSHIP EFFECTIVENESS

2108: OFFICER CAREER DEVELOPMENT TECHNOLOGIES

TECHNOLOGICAL OPPORTUNITY:

The effects of recent Congressional and Army policy changes and requirements on officer career development have not been tracked. New technologies may provide opportunities to assess the simultaneous impact of multi-level organizational changes, historical events, and individual career events. Policy makers need information and tools to ensure that complex career development requirements are well managed. Such decision aids and information sources may help the Army meet its officer manpower and personnel requirements.

TECHNOLOGICAL OBJECTIVE:

To explore and establish research and development methodologies and tools to provide officer career related information to policy makers. Existing methods and prototypes from Army, civilian, and other military manpower and personnel technologies will be examined for their cost-effectiveness and empirical soundness for application to officer career development issues. New qualitative and quantitative data and methodologies will be explored to allow rapid responses to changing officer career policies and events.

TECHNOLOGICAL IMPACT:

Prototypes and methods will be developed that identify the costs and benefits of alternative officer force structure changes and plans through the career cycle. These methodologies may provide a more accurate means for organizing complex information needed for policy analysis, allowing long-term determination of officer career development policy effectiveness, especially regarding academic preparation, functional area specialization, and joint career assignments. This will provide information needed for more rapid intervention and policy adjustments.

6.2 PRIORITY: TBD

FUNDING:	FY92	FY93	**END DATE:** FY97
6.2	0	269	

PERFORMING ELEMENT:

MANPOWER AND PERSONNEL POLICY RESEARCH GROUP
MANPOWER AND PERSONNEL RESEARCH LABORATORY

PROGRESS:

New Start

FY92/93 MILESTONES:

Annualized Cost of Leaving for Army Officers in Special Branches	FY93

PROJECTED TECHNOLOGY PRODUCTS:

Prototype Methodology for Delivery of Cost-Effective Officer Career Decision Information	FY97

2109: TECHNOLOGICAL APPLICATIONS TO IMPROVE RECRUITING

TECHNOLOGICAL OPPORTUNITY:

New tools and methodologies are available to directly assess trade-offs among economic, psychological and socio-demographic factors that influence enlistment decisions. Such tools are now being developed and used in the civilian sector for rapid accumulation, analysis, and delivery of decision information. New technologies are also emerging in the area of attitude and demographic data collection that should be useful in providing Army decision-makers at all levels with better methods to obtain and use information on markets and individual prospects.

TECHNOLOGICAL OBJECTIVE:

To determine cost effective and statistically sound methods for the collection, analysis, and delivery of primary recruiting decision- and policy-making data and information. Both qualitative and quantitative methodologies for attitude and demographic information synthesis will be examined as they apply to personnel and recruiting decision-making. Explore new recruiting information technologies to provide recruiters with better sources of market data by which to identify and reach market segments. Examine future recruiting roles and determine the most effective methods for implementing rapid change to information systems.

TECHNOLOGICAL IMPACT:

Effects of economic, psychological, and sociological factors, as well as of incentives and marketing programs under Army control can be more rapidly and accurately identified. Methodologies providing the basis for more cost-effective obtaining of recruiting market information will show where efficiencies can be gained so that force quality can be sustained with fewer resources. These methodologies may provide the basis for the development and implementation of recruiting management programs and provide policy makers with more rapid information on recruiting and marketing approaches.

6.2 PRIORITY: TBD

FUNDING:	FY92	FY93	**END DATE:** FY97
6.2	0	188	

PERFORMING ELEMENT:

MANPOWER AND PERSONNEL POLICY RESEARCH GROUP
MANPOWER AND PERSONNEL RESEARCH LABORATORY

PROGRESS:

New Start

FY92/93 MILESTONES:

Report on cost-effectiveness of Army data collection and delivery systems	FY93

PROJECTED TECHNOLOGY PRODUCTS:

Prototype technologies to improve recruiting decision information	FY97

2211: ALTERNATIVE SELECTION AND EVALUATION TECHNIQUES

TECHNOLOGICAL OPPORTUNITY:

Traditional aptitude testing has involved a heavy reliance on general cognitive ability. While these tests have had reasonably good success in predicting performance, recent theoretical developments suggest that substantial improvements are possible.

TECHNOLOGICAL OBJECTIVE:

Increase the Army's selection and classification capability (a) new measurements of general ability, (b) improved prediction of leadership and stress-related performance, and (c) reduction of measurement error in temperament and psychomotor/spatial tests.

TECHNOLOGICAL IMPACT:

Aptitude tests currently play a predominant role in the selection and classification of all enlisted personnel, and a lesser role in the selection of officers. Should the apparent potential in new approaches to measurement of general ability be realized, the result would be increased accuracy in selecting those soldiers and officers who are likely to perform effectively in the Army.

6.2 PRIORITY: 12 OF 25

FUNDING:	FY92	FY93	**END DATE:** FY94
6.2	961	930	

PERFORMING ELEMENT:

SELECTION AND CLASSIFICATION TECHNICAL AREA
MANPOWER AND PERSONNEL RESEARCH LABORATORY

PROGRESS:

Preliminary evaluation of usefulness of biographical data for predicting attrition of officers	FY91
Preparation of statement of work for developing new tests of general ability as alternatives to the Armed Services Vocational Aptitude Battery (ASVAB)	FY91

FY92/93 MILESTONES:

Preliminary Evaluation of coaching effects on temperament and spatial measures	FY92
Plan for developing new tests of general ability as alternatives to ASVAB	FY92
Initial development of new test of general ability	FY93
Evaluation of coaching effects on temperament and spatial measures	FY93

PROJECTED TECHNOLOGY PRODUCTS:

Methods for addressing coaching effects on temperament and spatial measures	FY94
New measures of general ability	FY94

2218: DETERMINING MINIMAL ENTRY QUALIFICATIONS

TECHNOLOGICAL OPPORTUNITY:

New methods for determining minimal entry qualifications are needed. Existing methods are limited in coverage of relevant individual characteristics and in their linkage to specific levels of performance.

TECHNOLOGICAL OBJECTIVE:

(A) Identify individual characteristics that can help predict performance of soldiers with average to below average cognitive ability. (B) Identify Army Military Occupational Specialties (MOS) that can be performed most effectively by soldiers with average to below average cognitive ability. (C) Determine best composite for predicting performance of the soldiers. (D) Determine how to set minimum entry standards on these composites for individual MOS.

TECHNOLOGICAL IMPACT:

With the continued decline of the numbers of military-eligible youth, the Military Services may have to accept larger numbers of applicants of average to below average cognitive skills. If improved performance of such soldiers can be obtained by better prediction prior to accessioning, millions of dollars can be saved annually in recruiting and training costs associated with attrition of low ability soldiers. Improved performance can also enhance combat readiness.

6.2 PRIORITY: 2 OF 25

FUNDING:	FY92	FY93	**END DATE:** FY94
6.2	267	322	

PERFORMING ELEMENT:

SELECTION AND CLASSIFICATION TECHNICAL AREA
MANPOWER AND PERSONNEL RESEARCH LABORATORY

PROGRESS:

New Start

FY92/93 MILESTONES:

Preliminary identification of characteristics predicting performance of soldiers with low Armed Forces Qualification Test (AFQT) scores	FY92
Development of model for predicting performance of soldiers with below average cognitive ability	FY93

PROJECTED TECHNOLOGY PRODUCTS:

New selection techniques for soldiers with low AFQT scores	FY94

2304: LONG-TERM EFFECTS OF MILITARY SERVICE: OFFICER CAREER PATTERNS

TECHNOLOGICAL OPPORTUNITY:

New theory and methods to conceptualize, describe and model officer career development patterns and decisions are emerging. These methods have not, as yet, been widely applied to understanding the long-term effects of military service, but early applications have proved promising.

TECHNOLOGICAL OBJECTIVE:

To develop new technologies to improve active duty and reserve officer recruiting and retention by identifying the benefits for the individual of Army service. Examine effect of prior military experiences on soldier productivity in the Active and Reserve forces? Determine how decisions are made throughout the military officer career cycle and how decisions can be influenced.

TECHNOLOGICAL IMPACT:

Development of a theoretical basis for the formulation of recruiting and career strategies for high quality officers.

6.2 PRIORITY: 14 OF 25

FUNDING:	FY92	FY93	**END DATE:** FY93
6.2	927	235	

PERFORMING ELEMENT:

MANPOWER AND PERSONNEL POLICY RESEARCH GROUP
MANPOWER AND PERSONNEL RESEARCH LABORATORY

PROGRESS:

Longitudinal Research on Officers' Careers (LROC) 1988 Survey	FY89
LROC 1989 Survey	FY90
LROC 1988/89 and Proteus technical manuals and codebooks	FY91
LROC 1990 Survey	FY91
The effect of category versus continuous variable modeling with economic data: Monte Carlo and empirical evidence	FY91
Theoretical model of officer careers	FY91
LROC: An overview of findings and officer careers	FY91
An examination of branch satisfaction of junior officers	FY91

FY92/93 MILESTONES:

LROC 1991/92 data collection	FY92
Report on branch/functional area shortages	FY92
Results of interviews with junior officers	FY92
Effect of downsizing on junior officer career intentions	FY92

PROJECTED TECHNOLOGY PRODUCTS:

Model of Officer Career Development	FY93

2306: SOCIO-PSYCHOLOGICAL BENEFITS OF ARMY SERVICE

TECHNOLOGICAL OPPORTUNITY:

Traditional analyses of the effect of military service has involved heavy reliance on the economic benefits or earnings of veterans. While these technologies have had a reasonably good success in evaluating a part of social benefits of military service, recent theoretical developments in social life course analyses suggest that substantial improvements can be made by integrating economic and non-economic benefits of military service. The economic technologies encompassing earnings can be extended to evaluate monetary values of fringe benefits.

TECHNOLOGICAL OBJECTIVE:

Increase the Army's ability to measure economic and non-economic benefits of Army service. Develop process models rather than stage models of adult development to articulate the linkages between organizational, social, and historical changes and individual life course transitions.

TECHNOLOGICAL IMPACT:

Economic technologies currently play a predominant role in the theoretical development of social welfare effects of military service. Should the apparent potential in new approaches to measurement of comprehensive benefits be realized, the result would considerably enhance the framework of the beneficial effects generated by military service. The Army would tend to benefit by the newer measurements in terms of increased recruitment and retention of high quality soldiers and their continuation in Army Reserve/National Guard units.

6.2 PRIORITY: 21 OF 25

FUNDING:	FY92	FY93	**END DATE:** FY97
6.2	463	915	

PERFORMING ELEMENT:

PERSONNEL UTILIZATION TECHNICAL AREA
MANPOWER AND PERSONNEL RESEARCH LABORATORY

PROGRESS:

FY92/93 MILESTONES:

Review of theoretical social life course technologies	FY92
Development of comprehensive economic benefit technology	FY92
Development of a theoretical process technology	FY93
Integration of economic and process technologies	FY93
Validation of integrated theoretical technologies	FY93

PROJECTED TECHNOLOGY PRODUCTS:

Methods of theoretical life course technologies	FY92
Theoretical model of comprehensive economic assessment	FY93
An integrated model of social life course perspective	FY94
Plan for longitudinal data development	FY95
Validation of life course theory for Army experience	FY96
Social benefit/cost implications of Army service	FY97

2405: FACTORS INFLUENCING LEADERSHIP EFFECTIVENESS

TECHNOLOGICAL OPPORTUNITY:

The experience of Desert Storm commanders, from the four-star down through battalion command levels provides a unique opportunity for filling voids in current mid-level leadership doctrine. Current doctrine reflects full understanding of mid-level leadership factors that affect organizational performance. Research is needed to develop the empirical base for theoretically-sound leadership doctrine. It must reflect sequential and progressive increase in leadership performance requirements at successively higher levels and provide tested principles and techniques for enhancing innovative thinking.

TECHNOLOGICAL OBJECTIVE:

To develop concepts and principles of instruction to enable the more effective mid-level and strategic leadership training. The research will develop and test training methods designed to give students insight into their problem solving strategies. Interview findings with Desert Storm commanders will be used to identify the processes and methods used at the mid-level to translate and communicate the commander's operational concepts to the fighting units. Emphasis will be on information flow, planning, command and control, personal management policies, procedures and operating practices.

TECHNOLOGICAL IMPACT:

This research will provide a descriptive theoretical basis for the design of leader development and training policy across the different service school and command levels.

6.2 PRIORITY: 20 OF 25

FUNDING:	FY92	FY93	**END DATE:** FY93
6.2	379	302	

PERFORMING ELEMENT:

EXECUTIVE DEVELOPMENT RESEARCH GROUP
MANPOWER AND PERSONNEL RESEARCH LABORATORY

PROGRESS:

Literature review on innovative unstructured problem solving	FY90
Identification of correlates of innovative problem solving	FY90
Experimental Army War College (AWC) Elective Course: Creative Problem Solving I	FY90
Strategic Leadership Conference and Proceedings	FY91
War College Special Text: Strategic Leadership	FY91
Experimental AWC Elective Course: Creative Problem Solving II	FY91

FY92/93 MILESTONES:

Book: Strategic Leadership	FY92
Video tapes of interviews Operation Desert Storm commanders	FY92
Special Text: Leadership Lessons Learned from Operation Desert Storm	FY92
Book: Lessons learned from Operation Desert Storm for civilian and military audiences	FY93
Report: Cognitive Maps and Leadership Profiles of Operation Desert Storm Commanders	FY93
Report: Mid-Level Leadership and Operational Unit Effectiveness	FY93

PROJECTED TECHNOLOGY PRODUCTS:

Instructional technology for enhancing creative (unstructured) problem solving	FY92
Theoretical basis for mid-level leadership doctrine	FY93
Theoretical basis for specifying a sequential and progressive leader development system	FY93

Exploratory Development

PROGRAM AREA 3: Training for Combat Effectiveness

3103: TECHNOLOGIES FOR COLLECTIVE TRAINING DEVELOPMENT

3106: THE USE OF SIMULATED ENVIRONMENTS FOR TRAINING

3201: LOW-COMPLEXITY SIMULATION TRAINING FOR AVIATION UNIT TACTICAL SUPERIORITY

3204: TRAINING REQUIREMENTS FOR COMBINED ARMS SIMULATORS

3206: TECHNOLOGY FOR TRAINING AND ASSESSING PERFORMANCE OF SMALL-UNIT COMMANDERS IN NETWORKED SIMULATORS

3210: ADVANCED LANGUAGE LEARNING TECHNOLOGY

3221: SIMULATION FIDELITY REQUIREMENTS FOR COST-EFFECTIVE AVIATION TRAINING

3302: ACQUISITION AND RETENTION OF COGNITIVE SKILLS

3305: PERCEPTUAL SKILL TRAINING FOR COMBAT

3401: COLLECTIVE SKILL DEVELOPMENT AND SUSTAINMENT

3409: LEADER TRAINING TECHNIQUES FOR THE YEAR 2000

3415: VISUALIZATION OF THE BATTLEFIELD

3430: METHODOLOGIES FOR ASSESSING SIMULATION-BASED BRIGADE TRAINING ALTERNATIVES

3103: TECHNOLOGIES FOR COLLECTIVE TRAINING DEVELOPMENT

TECHNOLOGICAL OPPORTUNITY:

Significant progress in research in expert systems technology and cognitive/instructional psychology (e.g., cognitive models of the authoring process) have provided the opportunity for developing technologies in the form of computer-based tools for supporting the process of collective training development.

TECHNOLOGICAL OBJECTIVE:

To design and develop prototype automated tools and techniques that make collective training development more effective and efficient by providing new capabilities to users who do not have much training development experience.

TECHNOLOGICAL IMPACT:

Decision aids for mission/task analysis, training requirements specification, and development of unit training programs, will reduce the time and developmental costs of these efforts. Success in this program will significantly reduce the resources and expertise required to create and update collective training programs. For example, reduction in the time needed to produce ARTEP/AMTP documents will result in timely training products that more accurately present current tactical doctrine and training requirements, and thereby, help maintain force readiness.

6.2 PRIORITY: 18 OF 25

FUNDING:	FY92	FY93	**END DATE:** FY95
6.2	550	501	

PERFORMING ELEMENT:

AUTOMATED INSTRUCTIONAL SYSTEMS TECHNICAL AREA
TRAINING RESEARCH LABORATORY

PROGRESS:

Prototype automated test-development aid for eventual use in the Automated Systems Approach to Training (ASAT) computer system	FY91

FY92/93 MILESTONES:

Model the collective training development process	FY92
Conceptual framework for collective training development tools	FY92
Identify specific high need-high payoff collective training development tools	FY92
Initiate development of prototype computer-based tools for collective training program development	FY93

PROJECTED TECHNOLOGY PRODUCTS:

Functional specification of computer-based aids for collective training developers using ASAT	FY94
Prototype intelligent system for collective training development	FY95

3106: THE USE OF SIMULATED ENVIRONMENTS FOR TRAINING

TECHNOLOGICAL OPPORTUNITY:

Technological advances such as Computer Image Generators, vehicle electronics, virtual environments (e.g., "cyberspace") and helmet-mounted displays are rapidly increasing the Army's capability to simulate significant aspects of the combat environment for individual and unit training and for performance assessment. These new technologies cannot be used to maximum effectiveness, however, without the development of a corresponding "behavioral technology" for the development of strategies for their employment in an integrated soldier, leader, and unit training system.

TECHNOLOGICAL OBJECTIVE:

To develop and evaluate methods and strategies for the use of simulated training environments (such as virtual reality or "cyberspace") in stand-alone devices and networked simulators.

TECHNOLOGICAL IMPACT:

Improved specifications for utilization of stand-alone and networked devices to create realistically simulated combat training environments for leaders and individual soldiers that will reduce the cost of training exercises and mission rehearsal in terms of fuel, ammunition, facilities, environmental impact, security, and time.

6.2 PRIORITY: 16 OF 25

FUNDING:	FY92	FY93	**END DATE:** FY98
6.2	558	529	

PERFORMING ELEMENT:

PM TRADE FIELD UNIT
TRAINING RESEARCH LABORATORY

PROGRESS:

Guidelines for selecting tasks to be trained by embedded training	FY91

FY92/93 MILESTONES:

Establish multi-service virtual environments research testbed	FY92
Initiate research on improving mission planning and rehearsal by using virtual environments	FY93
Methodology for selecting tasks for training using virtual environments	FY93

PROJECTED TECHNOLOGY PRODUCTS:

Individual and unit performance assessment methods in virtual combat environments	FY96
Methods for using virtual environments for combat training	FY98

3201: LOW-COMPLEXITY SIMULATION TRAINING FOR AVIATION UNIT TACTICAL SUPERIORITY

TECHNOLOGICAL OPPORTUNITY:

Recent dramatic advances in computer graphics and microprocessor based technology will be exploited in a joint U.S. Army/Canadian/ U.S. Air Force research facility that ARI is developing at Fort Rucker. This rotary wing simulator testbed will provide the opportunity for research to identify the minimum levels of simulator fidelity that are essential for effective aviation task training.

TECHNOLOGICAL OBJECTIVE:

To develop a modular, rotary wing simulator testbed for research to establish the required training characteristics and functions of aviation task training devices and simulators.

TECHNOLOGICAL IMPACT:

A unique research facility will be available to determine minimum essential training requirements for aviation training devices and simulators. Research findings will be used in developing training requirements for future flight simulators which can be afforded at the company level for Active and Reserve Component aviators.

6.2 PRIORITY: 1 OF 25

FUNDING:	FY92	FY93	**END DATE:** FY93
6.2	1875	600	

PERFORMING ELEMENT:

FORT RUCKER (AVIATION RESEARCH AND DEVELOPMENT ACTIVITY)
TRAINING RESEARCH LABORATORY

ATBMP SCIENTIFIC AND TECHNICAL OBJECTIVE: V-B-5 SIMULATION FIDELITY

PROGRESS:

Project agreement for joint U.S./Canada cost-shared simulator testbed development	FY86
Simulator complexity testbed (SCTB) development initiated	FY87
Empirical determination of training effectiveness of low cost visual system add-on to an initial entry rotary-wing (IERW) primary phase trainer	FY88
Experimental evaluation of training effectiveness of ground texturing options for low cost visual graphics system for IERW	FY89
Breadboard, low cost, high fidelity computer image generator (CIG) for flight simulator aviation combat	FY91

FY92/93 MILESTONES:

Installation of the SCTB and acceptance testing	FY92
Shakedown experiments on variables affecting flight simulator visibility in out-of-cockpit scenes	FY93

PROJECTED TECHNOLOGY PRODUCTS:

Testbed established for research on minimum levels of simulator fidelity required for effective aviation task training	FY93

3204: TRAINING REQUIREMENTS FOR COMBINED ARMS SIMULATORS

TECHNOLOGICAL OPPORTUNITY:

To manage training efficiently, new methodologies for measuring unit performance effectiveness down to individual weapon system, and then applying the knowledge gained to manage training efficiently, need to be developed to take advantage of the technological advances in simulator networks (e.g., Simulation Network (SIMNET)).

TECHNOLOGICAL OBJECTIVE:

To design and develop performance measurement and training management methodologies for use with networked simulators as a means for improving combined arms unit training effectiveness.

TECHNOLOGICAL IMPACT:

The prototype measurement and training management methodologies will be used to support improvements in networked simulators. Advanced development of effective methods and measurement techniques for training with networked simulators will support units to train as they will fight.

6.2 PRIORITY: 7 OF 25

FUNDING:	FY92	FY93	**END DATE:** FY92
6.2	229	0	

PERFORMING ELEMENT:

FORT KNOX FIELD UNIT
TRAINING RESEARCH LABORATORY

PROGRESS:

Completed analysis of commonality of SIMNET and National Training Center (NTC) databases	FY89
Developed concept for SIMNET exercise planning and control	FY89
Developed concept for SIMNET/NTC common performance measurement system	FY89
Developed prototype SIMNET exercise management and control system	FY90
Developed prototype SIMNET performance measurement system	FY90
Determined appropriate tasks for SIMNET training	FY91

FY92/93 MILESTONES:

Define and implement the concept of a SIMNET take-home package (THP)	FY92

PROJECTED TECHNOLOGY PRODUCTS:

SIMNET performance measurement, exercise management and control methodologies	FY92
User's guide for the Unit Performance Assessment System	FY92

3206: TECHNOLOGY FOR TRAINING AND ASSESSING PERFORMANCE OF SMALL-UNIT COMMANDERS IN NETWORKED SIMULATORS

TECHNOLOGICAL OPPORTUNITY:

The Battlefield Distributed Simulation Developmental (BDS-D) will provide a state-of-the-art soldier-in-the-loop simulation for units at battalion and below. BDS-D provides an opportunity for the development of new training and performance assessment technologies during the conceptual phase of system development. BDS-D's reconfigurability provides simulation of command and control systems as well as future target location (battlefield sensor) systems. Its flexible instrumentation capabilities also support the development and assessment of performance measurement technologies, the specification of future training requirements and the development of new training methods.

TECHNOLOGICAL OBJECTIVE:

To design and develop simulation-based performance assessment technologies and methods for training future leaders at battalion level and below, concentrating on the information integration and distribution requirements associated with new battlefield sensor and command and control systems being inserted in ground combat vehicles and operating centers in support of AirLand Operations doctrine.

TECHNOLOGICAL IMPACT:

The success of future AirLand Operations doctrine relies on the skills of small unit commanders to capitalize on new battlefield sensor systems to acquire, locate and track both enemy and friendly units and new automated communications systems to integrate and distribute this information. Taking full advantage of new simulation technologies for performance assessment and training ensures that commanders will have the requisite skills to fight and win on the future battlefield.

6.2 PRIORITY: 10 OF 25

FUNDING:	FY92	FY93	**END DATE:** FY96
6.2	561	508	

PERFORMING ELEMENT:

FORT KNOX FIELD UNIT
TRAINING RESEARCH LABORATORY

PROGRESS: New Start

FY92/93 MILESTONES:

Identify future high-tech C^3 and battlefield sensor components which may most affect command and staff performance	FY92
Determine training needs for future information integration and distribution tasks	FY93
Develop new training methods for information integration tasks	FY93

PROJECTED TECHNOLOGY PRODUCTS:

"Electronic Sandtable": A prototype training and assessment technology for information integration	FY95
"Electronic Sandbox": A prototype training and assessment technology for information distribution	FY96

3210: ADVANCED LANGUAGE LEARNING TECHNOLOGY

TECHNOLOGICAL OPPORTUNITY:

Rapid increase in the speed and power of computers, combined with recent improvements in understanding how foreign languages are learned, provide unique opportunities for developing individualized language instruction by computer. Basic research has begun to show which second language teaching techniques and strategies are most instructionally effective and motivating. The first computer-based systems that incorporate such strategies are now starting to be built and must be capitalized on with research to develop new capabilities for improving language skill training.

TECHNOLOGICAL OBJECTIVE:

To develop a computer-based tutor incorporating recent developments in electronic technology and learning strategies and techniques for the purpose of improving acquisition and sustainment training of military linguistic skills.

TECHNOLOGICAL IMPACT:

After a new language learning technology is developed, an advanced development effort will apply it to MOS-specific foreign language instruction. It is expected that there will be a 25% improvement in the efficiency with which language proficiency is increased from Level 0 to 2 by reducing instructor time needed to teach and maintain foreign language skills for specific Military Occupational Specialties (MOS).

6.2 PRIORITY: 11 OF 25

FUNDING:	FY92	FY93	**END DATE:** FY95
6.2	750	934	

PERFORMING ELEMENT:

AUTOMATED INSTRUCTIONAL SYSTEMS TECHNICAL AREA
TRAINING RESEARCH LABORATORY

ATBMP SCIENTIFIC AND TECHNICAL OBJECTIVE: V-B-6 LANGUAGE SKILL TRAINING

PROGRESS: New Start

FY92/93 MILESTONES:

Completed parsers in German and Arabic	FY92
Prototype MOS Courseware	FY92
Version 2.0 language tutor components:	
•Pragmatics analyzer	FY93
•Semantics analyzer	FY93
•Discourse helper	FY93

PROJECTED TECHNOLOGY PRODUCTS:

Version 3.0 "breadboard" language tutor	FY95

3221: SIMULATION FIDELITY REQUIREMENTS FOR COST-EFFECTIVE AVIATION TRAINING

TECHNOLOGICAL OPPORTUNITY:

A joint Canadian/US Army/USAF simulator testbed for aviation training research is under development at Fort Rucker. This facility, which contains a state-of-the-art computer image generator (CIG) and visual system, provides the opportunity for determining minimum levels of simulation fidelity that are absolutely essential for specific tasks to be trained effectively at minimum cost. Variables that can be considered include display resolution, field of view, motion, weapons effects, etc.,

TECHNOLOGICAL OBJECTIVE:

To establish, through a comprehensive and systematic experimental program, the required simulation fidelity characteristics and training functions of devices varying in complexity from part-task trainer through full mission simulator as a function of specific tasks to be trained and the skill levels to be achieved.

TECHNOLOGICAL IMPACT:

Research findings will be used in developing training requirements and strategies for future flight simulators. As a result, lower cost flight simulators will be procured, capable of training all critical mission tasks. Efficiencies derived from this research will lead to more effective use of all training resources including aircraft flight time.

6.2 PRIORITY: TBD

FUNDING:	FY92	FY93	**END DATE:** FY98
6.2	0	1686	

PERFORMING ELEMENT:

FORT RUCKER (AVIATION RESEARCH AND DEVELOPMENT ACTIVITY)
TRAINING RESEARCH LABORATORY

ATBMP SCIENTIFIC AND TECHNICAL OBJECTIVE: V-B-5 SIMULATION FIDELITY

PROGRESS: New Start

FY92/93 MILESTONES:

Research database on flight simulator field-of-view training effectiveness	FY93

PROJECTED TECHNOLOGY PRODUCTS:

Experimental findings identifying fidelity requirements for training of tasks varying in difficulty/complexity	FY95-98
Computer model for rapid visual database preparation	FY98

3302: ACQUISITION AND RETENTION OF COGNITIVE SKILLS

TECHNOLOGICAL OPPORTUNITY:

New theories and research findings have emerged on the learning and retention of procedural tasks and complex perceptual-motor tasks. Research on perception, mathematical models of human information processing, programming, and skill decay have created the opportunity to consolidate our understanding of how soldiers acquire complex cognitive skills and retain them over time, through a unified theory of skill acquisition and retention.

TECHNOLOGICAL OBJECTIVE:

To develop and validate a theory of complex skill acquisition and retention that integrates recent research on individual skill proficiency; to test the model on a broad range of Army tasks, to ultimately provide training managers with the capability to identify requirements for planning training strategies that enhance the effectiveness of individual instruction.

TECHNOLOGICAL IMPACT:

Army trainers will be able to allocate training resources based on predictions of how well any particular skill is retained, rather than distributing time to across-the-board retraining. There will be better use of training resources by:

- identifying skills that are more likely to be forgotten
- identifying individuals who are more likely to forget
- recommending training strategies for improved acquisition and retention of complex cognitive skills

6.2 PRIORITY: 9 OF 25

FUNDING:	FY92	FY93	**END DATE:** FY94
6.2	285	290	

PERFORMING ELEMENT:

AUTOMATED INSTRUCTIONAL SYSTEMS TECHNICAL AREA
TRAINING RESEARCH LABORATORY

ATBMP SCIENTIFIC AND TECHNICAL OBJECTIVE: V-B-8 COGNITIVE AND COLLECTIVE SKILL RETENTION

PROGRESS:

Completed baseline data collection on Mobile Subscriber Equipment skill retention	FY89
Completed data collection on cognitive strategy training	FY89
Completed data collection on voice-code method of Morse Code training	FY89
Model of perceptual-motor skill acquisition	FY91

FY92/93 MILESTONES:

Test generality of cognitive skills retention model in problem-solving environment	FY92

PROJECTED TECHNOLOGY PRODUCTS:

Neural network model to predict perceptual-motor skill acquisition/retention	FY93
Model to predict acquisition and retention of problem-solving skills	FY94

3305: PERCEPTUAL SKILL TRAINING FOR COMBAT

TECHNOLOGICAL OPPORTUNITY:

The use of night vision goggles and other visual aiding devices (e.g., thermal sights) provide a technological advantage to the U.S. Army. In circumstances when these devices are not available, however, our soldiers should be prepared to perform well without them. Sufficient empirical data are not available as to the trainability of perceptual skills required for operating effectively on the battlefield under varying illumination conditions.

TECHNOLOGICAL OBJECTIVE:

To determine what battlefield terrain visual characteristics and cues are essential to successful performance of battlefield tasks; to determine how to train perception of these cues under conditions varying from unaided nighttime illumination to daylight.

TECHNOLOGICAL IMPACT:

Increased understanding of the relationships between visual battlefield characteristics and soldier visual/perceptual processes will enhance battlefield performance through development of future training programs.

6.2 PRIORITY: 17 OF 25

FUNDING:	FY92	FY93	**END DATE:** FY98
6.2	258	247	

PERFORMING ELEMENT:

FORT BENNING FIELD UNIT
TRAINING RESEARCH LABORATORY

PROGRESS:

Design of experiments on extent of natural dark adaptation, and un-aided night vision capability	FY90
Review of literature on spatial visualization	FY90
Review of literature on unaided night vision	FY90
Information paper alerting Operation Desert Shield forces of need to protect eyes from bright desert light by wearing very dark sunglasses, in order to avoid degrading their night vision capability	FY91

FY92/93 MILESTONES:

Develop experimental techniques and training for enhancing unaided night vision	FY92
Initiate battlefield terrain context/perceptual cue research	FY93
Experimental training program for enhancing unaided night vision for target detection and maneuver	FY93

PROJECTED TECHNOLOGY PRODUCTS:

Recommended visual perception training for combat	FY97
Validated techniques for improvement of visual perception under daylight and twilight conditions	FY98

3401: COLLECTIVE SKILL DEVELOPMENT AND SUSTAINMENT

TECHNOLOGICAL OPPORTUNITY:

Individual soldiers' skills have been the focus of a body of previous research on procedural skill retention. An important outcome of this work was a skill retention model that allows the trainer to estimate task proficiency levels and project the rate of proficiency loss over a 12-month period based on task characteristics demonstrated to be related to skill retention. An opportunity exists to expand this model to estimate proficiency and retention of collective tasks.

TECHNOLOGICAL OBJECTIVE:

To develop predictive models and algorithms that estimate training requirements for sustaining a given level of collective skill proficiency, as a function of: collective task characteristics; time between training; rates of skill decay; and personnel turnover in the unit (squad, platoon, and company).

TECHNOLOGICAL IMPACT:

Accurate predictions of training requirements will improve scheduling of collective task training. Scarce training time and resources (e.g., OPTEMPO) will be used more productively by not training tasks when training is not needed; readiness will be improved by properly scheduling tasks for training when collective skills are deficient.

6.2 PRIORITY: 13 OF 25

FUNDING:	FY92	FY93	**END DATE:** FY92
6.2	218	0	

PERFORMING ELEMENT:

PRESIDIO OF MONTEREY FIELD UNIT
TRAINING RESEARCH LABORATORY

ATBMP SCIENTIFIC AND TECHNICAL OBJECTIVE: V-B-8 COGNITIVE AND COLLECTIVE SKILL RETENTION

PROGRESS:

Completed literature review on factors influencing unit skill development and maintenance	FY89
Analyzed Joint Readiness Training Center data to determine conformity with predictions from task classification system	FY90
Completed survey of training, performance and resource utilization in Multiple Launch Rocket System (MLRS) units	FY90
Developed and applied task and team classification systems to mechanized infantry, light infantry, and armor	FY91
Draft report on taxonomies/classifications for Army tasks and teams	FY91

FY92/93 MILESTONES:

Evaluate and refine model for estimating required frequency of training for unit collective tasks	FY92

PROJECTED TECHNOLOGY PRODUCTS:

Collective skill retention curves for different types of tasks and teams	FY92
Model for prediction of required frequency of task training for maintaining unit proficiency	FY92

3409: LEADER TRAINING TECHNIQUES FOR THE YEAR 2000

TECHNOLOGICAL OPPORTUNITY:

Current leadership theories suggest a number of key situational factors, such as the attitudes and skill level of subordinates and the command climate, which affect the effectiveness of leadership styles. These theories can be advanced and tested for their applicability to expected changes in future battlefield conditions such as: the use of increasingly sophisticated technology for planning, controlling, and conducting operations; more closely integrated joint and multi-national operations; and highly intense, fluid, and fast paced situations in which units are potentially isolated from other elements of the organization.

TECHNOLOGICAL OBJECTIVE:

To expand current leadership theories by identifying the leadership warfighting skills and capabilities needed on the future battlefield and to design strategies for systematically training and developing them in junior and mid-level leaders.

TECHNOLOGICAL IMPACT:

Once validated, the theory-based training strategies designed in this research will significantly improve the Army's ability to prepare leaders for the future and upgrade the leadership training of its officers and NCOs.

6.2 PRIORITY: 22 OF 25

FUNDING:	FY92	FY93	**END DATE:** FY98
6.2	0	255	

PERFORMING ELEMENT:

LEADERSHIP AND MOTIVATION TECHNICAL AREA
TRAINING RESEARCH LABORATORY

PROGRESS: New Start

FY92/93 MILESTONES:

Identification of future battlefield conditions potentially significant to leadership effectiveness	FY93
Methodology for determining gaps in current leadership theories with regard to future combat situations	FY93

PROJECTED TECHNOLOGY PRODUCTS:

Leadership theory incorporating future battlefield situational factors critical to leader combat effectiveness	FY98
Training/development strategies to prepare junior and mid-level leaders for future battlefield situations	FY98

3415: VISUALIZATION OF THE BATTLEFIELD

TECHNOLOGY OPPORTUNITY:

Battle is characterized by rapid changes in the tactical situation and complex requirements for coordination and synchronization of many, diverse force elements. A major doctrinal requirement is the development of procedures which will assist the commander in "seeing the battlefield" and synchronization of all his combat assets. The Combat Training Center (CTC) database (communications, videotape, digital, written), and advanced graphical displays established at the ARI Presidio of Monterey Field Unit provide an opportunity for designing state-of-the-art training. Specifically, research will focus on expert system approaches for measuring, analyzing and projecting the outcome of alternative courses of action taken at critical points in battles resident in the CTC database, and thereby providing the commander with assistance to "visualize" the battlefield.

TECHNOLOGY OBJECTIVE:

To demonstrate an expert system for measuring and analyzing battles conducted at the tactical Combat Training Centers (NTC, JRTC, CMTC,), in order to provide commanders with the capability to "visualize the battlefield."

IMPACT/POTENTIAL PAYOFF:

This research will result in new skills for unit commanders to "visualize" a rapidly changing, dispersed and lethal battlefield. This capability will ultimately lead to more effective battlefield performance and improvement in tactical doctrine.

6.2 Priority: 5 OF 25

FUNDING:	FY92	FY93	**END DATE:** FY98
6.2	0	330	

PERFORMING ELEMENT:

PRESIDIO OF MONTEREY FIELD UNIT
TRAINING RESEARCH LABORATORY

ATBMP SCIENCE AND TECHNOLOGY OBJECTIVE: V-B-7 UNIT TRAINING STRATEGIES

PROGRESS: New Start

FY92/93 MILESTONES:

Determination of brigade and battalion staff requirements for "visualizing the battlefield" by Battle Operating Systems and battle phase	FY93
Establishment of a conceptual framework for "battlefield visualization"	FY93
Specification of CTC database components and their linkage to generate "battlefield visualization" prototype	FY93

PROJECTED TECHNOLOGY PRODUCTS:

Expert system for assessing unit tactical performance at CTCs	FY97
"Breadboard" technology (methods, instruction, data, displays) which enhances the unit commander's ability to "visualize the battlefield"	FY98

3430: METHODOLOGIES FOR ASSESSING SIMULATION-BASED BRIGADE TRAINING ALTERNATIVES

TECHNOLOGY OPPORTUNITY:

The availability of computer-supported simulations and battle exercises for unit combat training provide the opportunity to improve training for brigade task performance. Army Field Manuals 25-100 and 101 and the Army's recent Combined Arms Training Strategy (CATS) initiative provide the structure and guidance for what brigade training is needed for an efficient force. In support of that initiative, R&D is needed on how best to train and prepare a brigade for its new role as a key maneuver element in a mid-intensity air/land battle conflict. To make cost effective decisions, methodologies are needed for assessing training alternatives in all exercise phases -- planning, preparation, and execution. This R&D specifically will focus on creating methodologies for assessing brigade battle rehearsal effectiveness and training as a function of alternative approaches, e.g., the Battlefield Distributed Simulation (formerly SIMNET), National Training Center), and other training capabilities such as Command Post Exercises and Live Fire Exercises.

TECHNOLOGY OBJECTIVE:

To create a measurement capability for comparing mixes of brigade training alternatives using data obtained from computer-supported battle rehearsals and simulations.

IMPACT/POTENTIAL PAYOFF:

Measurement methodologies for mixing and matching training alternatives will more precisely define cost effective approaches to improving brigade training.

6.2 PRIORITY: 25 OF 25

FUNDING:	FY92	FY93	**END DATE:** FY97
6.2	286	279	

PERFORMING ELEMENT:

AUTOMATED INSTRUCTIONAL SYSTEMS TECHNICAL AREA
TRAINING RESEARCH LABORATORY

PROGRESS: New Start

FY92/93 MILESTONES:

Matrix of alternative simulator-based training methods and brigade-level task clusters designed	FY92
Initial set of performance indicators for brigade task clusters	FY92
New process and outcome indicators of brigade combat performance at the NTC comparatively evaluated by task clusters	FY93

PROJECTED TECHNOLOGY PRODUCTS:

Validated methodology for measuring brigade training alternatives	FY97
Methods for performing tradeoffs between brigade training alternatives	FY97

SECTION II

Advanced Development (6.3A) Program

PROGRAM AREA 1: Structuring and Equipping the Force

PROGRAM AREA 2: Manning and Leading the Force

PROGRAM AREA 3: Training for Combat Effectiveness

Advanced Development

PROGRAM AREA 1: Structuring and Equipping the Force

1203: SOLDIER ERRORS IN FIRE SUPPORT AND OTHER AUTOMATED WEAPON SYSTEMS

1204: PERFORMANCE-BASED MANPOWER, PERSONNEL AND TRAINING ESTIMATION

1205: SOLDIER PERFORMANCE IN THE CONCEPT-BASED REQUIREMENTS SYSTEM (CBRS)

1210: REDUCING AVIATOR AND MAINTAINER REQUIREMENTS IN NEXT GENERATION ARMY AVIATION SYSTEMS

1214: INFORMATION SYSTEM TECHNOLOGY FOR IMPROVING CREW COORDINATION AND PERFORMANCE IN THE COCKPIT

1216: MISSION AND PERFORMANCE-BASED ORGANIZATIONAL DESIGN

1217: FORWARD AREA AIR DEFENSE (FAAD) PERFORMANCE IN A CHEMICAL ENVIRONMENT

1219: IMPACT OF DOCTRINE DESIGN ON SOLDIER PERFORMANCE IN COMBAT

1304: ENHANCED COMMAND STAFF PERFORMANCE IN COMBAT OPERATIONS

1307: EVALUATING COMMAND POST PERFORMANCE

1309: PROGNOSTIC MODELS OF MILITARY INTELLIGENCE (MI) SOLDIER INFORMATION PROCESSING PERFORMANCE

1401: SOLDIER-SYSTEM CONSIDERATIONS IN FORCE DEVELOPMENT TESTING

1203: SOLDIER ERRORS IN FIRE SUPPORT AND OTHER AUTOMATED WEAPON SYSTEMS

ARMY NEED:

Data from training centers, the National Training Center, and the Joint Readiness Training Center show that effective utilization of Field Artillery (FA) is not the general condition. The Army needs research on FA integration performance, as well as improved information concerning the extent to which the "decision-burdens" of specific positions (e.g., Chief of Section) change as automated task aids enable or require decisions to be made at lower levels.

APPLICATION/PRODUCT OBJECTIVE:

To improve fire support effectiveness by providing the Army with products to improve processes and performance of persons responsible for the integration and application of fires; and to improve the performance of soldiers using automated weapon systems by applying analytic methods to identify the cause of, and to reduce or mitigate the effect of, errors in performing tasks with automated systems.

ARMY IMPACT/PAYOFF:

A better understanding of FA task integration will enable the Army to increase the quantity and effectiveness of fires in battle situations. Development of a methodology to analyze automated task difficulty will enable the Army to quantify the potential reduction in training requirements and personnel aptitude levels that can result if automated task difficulty is reduced. It is not unrealistic to have a goal of 10% improvement in FA effectiveness following a 10% reduction in automated task performance error rates.

PROPONENT(S)/SPONSOR(S): TRADOC (USAFACFS)

6.3A PRIORITY: 28 OF 30

FUNDING:	FY92	FY93	**END DATE:** FY97
6.3A	337	330	

PERFORMING ELEMENT:

FORT SILL FIELD UNIT
SYSTEMS RESEARCH LABORATORY

ATBMP SCIENTIFIC AND TECHNICAL OBJECTIVE: V-B-3 MANPRINT ASSESSMENT TECHNIQUES

PROGRESS:

Assessment of the Embedded Training System for the Howitzer Improvement Program (HIP) howitzer	FY89
Completed data collection and wrote draft of the report for the Soldier Performance Research Project for the MOS 13M	FY89
Data collection completed and draft report written for the Soldier Performance Research Project for MOS 13F	FY89
Concept Paper on Human Reliability "Attention Maintenance Scale"	FY91

FY92/93 MILESTONES:

Participate in empirical assessment of HIP and Platoon Operations Center (POC) performance effectiveness (in support of Operational Evaluation Command MOA during HIP Follow-on Test and Evaluation)	FY92
Collect Command Post Exercise (CPX) data from Janus based BattleLab, collate with Training Center data, and evaluate FA integration performance	FY93

PROJECTED PRODUCTS:

Automated data acquisition system: USAFAS-CPX level (BattleLab)	FY92
Measures for CPX FA integration and battlestaff performance	FY92
FA-CPX performance data base and standards	FY93
Fielded measures of FA integration and battlestaff performance for use at training centers	FY97
Soldier error control strategies for application to operation of automated systems	FY97

REQUIREMENT/MEMORANDUM OF AGREEMENT: Pending

1204: PERFORMANCE-BASED MANPOWER, PERSONNEL, AND TRAINING ESTIMATION

ARMY NEED:

The goal of the Army MANPRINT strategy is to influence the design of new weapon systems and to improve their battlefield effectiveness by systematically considering soldier performance. The earlier HARDMAN I and II predicted manpower requirements, but, did not link soldier resources to battlefield effectiveness, and were too slow (six months) and too expensive ($250K). Hence, they were ineffective at influencing system design. With no permanent analysis staff dedicated to MANPRINT, the Army's need was for an MPT estimation tool for pre-Milestone I use operable by existing GS-7-9-11 and Captain-Major level analysts.

APPLICATION/PRODUCT OBJECTIVE:

To develop a third-generation set of manpower, personnel, and training (MPT) estimation techniques for combat and materiel developers that, for the first time, can relate manpower, personnel, and training to battlefield effectiveness of new materiel systems prior to Milestone I. Techniques will be integrated with one another so that they will support tradeoff analyses of MPT variables with weapon characteristics, performance, and system costs.

ARMY IMPACT/PAYOFF:

The first major product of this research will be HARDMAN III which will provide approximately five times more relevant decision information in 3-4 analyst-weeks than HARDMAN I or II does in 75-100 analyst-weeks.

PROPONENT(S)/SPONSOR(S): TRADOC (DCSCD); ODCSPER (MANPRINT)

6.3A PRIORITY: 2 OF 30

FUNDING:	FY92	FY93	**END DATE:** FY98
6.3A	1875	1772	

PERFORMING ELEMENT:

MANNED SYSTEMS GROUP
SYSTEMS RESEARCH LABORATORY

ATBMP SCIENTIFIC AND TECHNICAL OBJECTIVE: V-B-3 MANPRINT ASSESSMENT TECHNIQUES

PROGRESS:

18 Concept papers	FY86
10 Design specs	FY87
LHX MANCAP	FY87
Development of SPARC, M-CON, P-CON, T-CON, MAN-SEVAL, and PER-SEVAL	FY90

FY92/93 MILESTONES:

Complete Beta test of first HARDMAN III modules	FY92

PROJECTED PRODUCTS:

MANpower-CAPability Analysis Aid (MANCAP) II	FY92
Human Operator Simulation (HOS)	FY93
FORCE (Extension of HARDMAN III to the Force level)	FY93
Soldier Characteristics Availability Data (SCAD) Aid Interface Redesign and Job and Training Tradeoff	FY94
HARDMAN III computer software	FY95
Integrated techniques to support MPT trade off analyses and weapon characteristics, performance, and system costs	FY98

REQUIREMENT/MEMORANDUM OF AGREEMENT:

Command: TRADOC (DCSCD)
Title: Performance-based Manpower, Personnel, and Training (MPT) Estimation--HARDware versus MANpower (HARDMAN) III
Eff. Date: 19 Nov 90

Command: ODCSPER (MANPRINT)
Title: Development of HARDware vs MANpower (HARDMAN III) Products
Eff. Date: 22 Mar 90

1205: SOLDIER PERFORMANCE IN THE CONCEPT-BASED REQUIREMENTS SYSTEM (CBRS)

ARMY NEED:

The Army, through the MANPRINT Program, seeks to improve the combat effectiveness of battlefield systems by optimizing the integration of soldier capabilities and weapons system technology. Most materiel acquisition decisions affecting this integration are made prior to Milestone I. Therefore, improved methods are needed for linking soldier performance to mission performance goals in the CBRS where the basis for requirements are established regarding materiel, doctrine, training, organization, and leadership contributions to combat capability.

APPLICATION/PRODUCT OBJECTIVE:

To develop analytical techniques, procedures, and information to enable the systematic consideration of soldier performance and resources in the Army's CBRS and related processes. Objective methods and databases will be provided to ensure that the soldier's role and soldier performance issues are explicitly considered in the analyses from which weapon system requirements are derived.

ARMY IMPACT/PAYOFF:

This research makes continued modernization more affordable by addressing the issues among doctrine, expected soldier quality and training, and system performance requirements before significant materiel R&D resources are committed.

PROPONENT(S)/SPONSOR(S): TRADOC (DCSCD)

6.3A PRIORITY: 24 OF 30

FUNDING:	FY92	FY93	**END DATE:** FY92
6.3A	301	0	

PERFORMING ELEMENT:

MANNED SYSTEMS GROUP
SYSTEMS RESEARCH LABORATORY

PROGRESS:

Report on soldier load factors completed for ADEA and the U.S. Army Infantry School	FY86
Report on integration in the Mission Area Analysis (MAA) process completed for application to CBRS	FY87
Report of tactical level, combat-related functional hierarchy published as TRADOC Pam 11-9	FY88
TRADOC Pam 11-9 revised to include operational and strategic levels	FY90
Draft TRADOC pamphlets on doctrine management and writing	FY91
Design of training course for doctrine writers completed	FY91

FY92/93 MILESTONES:

Blueprint of the Battlefield revised as necessary to encompass application to the entire operational continuum	FY92
Procedures developed for incorporating the full operational continuum in CBRS	FY92

PROJECTED PRODUCTS:

Long range plan for doctrine development	FY92
DA Pamphlet, Blueprint of the Battlefield	FY92

REQUIREMENT/MEMORANDUM OF AGREEMENT:

Command: TRADOC (DCSCD)
Title: Doctrinal Literature
Eff. Date: 03 Nov 88

1210: REDUCING AVIATOR AND MAINTAINER REQUIREMENTS IN NEXT GENERATION ARMY AVIATION SYSTEMS

ARMY NEED:

Recent advanced technology helicopters have substantially increased aircrew and maintenance demands and workload as well as the training required to develop and maintain proficiency. If these trends continue in emerging systems, the amount and cost of required transition and sustainment training can become prohibitive. The potential of advanced technology for reducing attention saturation, workload, and training requirements has not been fully realized in systems. This is because the Army lacks (1) the capability to analyze attention, workload, and training requirements and (2) proven helicopter system human factors design concepts for minimizing attention demands, workload, skill levels, and training.

APPLICATION/PRODUCT OBJECTIVES:

Develop and demonstrate MANPRINT manpower, personnel, and training tools that improve tactical performance and reduce aviator and maintainer expense of new Army aircraft. Use MANPRINT development experience with Army aviation to guide other MANPRINT R&D.

ARMY IMPACT/PAYOFF:

These efforts will improve the early identification of design factors that increase pilot workload and instances in which workload exceeds operator and maintainer capacity and will provide guidelines on how to structure the human requirements for systems to keep within the human capacity envelope. Enhancement of the Target Audience Description will lead to improved system design by giving system design engineers more empirical information on the abilities and attributes required for system operation and maintenance.

PROPONENT(S)/SPONSOR(S): AMC (AVSCOM)

6.3A PRIORITY: 11 OF 30

FUNDING:	FY92	FY93	**END DATE:** FY97
6.3A	721	667	

PERFORMING ELEMENT:

AVIATION SYSTEMS COMMAND ELEMENT
SYSTEMS RESEARCH LABORATORY

ATBMP SCIENTIFIC AND TECHNICAL OBJECTIVE: V-B-4 SOLDIER-SYSTEM PERFORMANCE ENHANCEMENT

PROGRESS:

MANPRINT input to the Light Helicopter Experimental (LHX) and SOF requests for proposals	FY87
Task Analysis of the AH-64 mission with crew workload estimates	FY87
MANPRINT input to the Apache airborne target handover system/avionics integration:	
Request for Proposals	FY87
Design Reviews	FY88-89
MANPRINT influence on the special operations aircraft design reviews	FY89
MANPRINT reference retrieval system (MANRRS)	FY89
Task Analysis and Workload Model (PC VERSION)	FY90
Meta Analysis of Aviator Selection Methods	FY91
Analysis of AIRNET in training collective ARTEP tasks	FY91
Survey of design engineers in the Army Materiel Development Community	FY91
Gunnery effectiveness of the AH1FWS and AH64CMS	FY91
Army aviator ability requirements	FY91
New flight aptitude selection test validation	FY91

FY92/93 MILESTONES:

Evaluation of the Special Operations aviation regiment civilian mission instructors	FY92
Guidelines for improved maintenance design of Army aviation systems	FY92
Validation of TAWL in an AH64CMS	FY92

Aviator Enhanced Target Audience Description-Personnel Module	FY92
Evaluation of MANPRINT influence on RAH-66	FY92
Maintainer Enhanced Target Audience Description requirements	FY93

PROJECTED PRODUCTS:

Maintainer task workload model	FY93
Maintainer-Enhanced Target Audience Description-Personnel Components	FY94
Comprehensive Aviator Enhanced Target Audience Description	FY95
Comprehensive Maintainer Enhanced Target Audience Description	FY96
MPT tools to improve tactical performance and reduce MPT costs of new aircraft	FY97

REQUIREMENT/MEMORANDUM OF AGREEMENT: Pending

1214: INFORMATION SYSTEM TECHNOLOGY FOR IMPROVING CREW COORDINATION AND PERFORMANCE IN THE COCKPIT

ARMY NEED:

Research reveals that aircrew coordination errors, rather than individual pilot errors, contribute to significantly decreased safety and mission effectiveness for Army helicopters. This is shown by the frequent implication of such errors in accidents associated with terrain flight tactics and night vision devices (NVD). Information system technology (IST), as used in commercial aviation, should be examined for its potential in dealing with this high-workload, time-stressed environment.

APPLICATION/PRODUCT OBJECTIVE:

The objectives of this project are (1) to identify opportunities for IST interventions in the complex-task helicopter cockpit; (2) to develop prototype applications of IST for assisting aircrews in cockpit resource management, information sharing, and decision making under time-stressed conditions; and (3) to demonstrate the utility of these applications in an advanced rotary wing flight simulator. Emphasis will be given to nap-of-the-earth (NOE) obstacle avoidance and navigation, and to operations using NVDs.

ARMY IMPACT/PAYOFF:

Nearly 80% of all aviation and ground accidents involve human error. Of these accidents, a significant portion represents crew coordination failure during time-stressed, tactical operations. In addition, crew error underlies a significant portion of accidents attributed to emerging technologies (e.g., NVDs). Research also suggests that coordination errors degrade tactical mission performance (e.g., threat evasion). This project will help identify (1) promising design concepts for improving aircrew performance in emerging systems and (2) proven strategies for controlling NOE-flight and NVD related accidents.

PROPONENT(S)/SPONSOR(S): TRADOC (USASC, USAAVNC)

6.3A PRIORITY: 9 OF 30

FUNDING:	FY92	FY93	**END DATE:** FY96
6.3A	299	294	

PERFORMING ELEMENT:

FORT RUCKER (AVIATION RESEARCH AND DEVELOPMENT ACTIVITY)
SYSTEMS RESEARCH LABORATORY

ATBMP SCIENTIFIC AND TECHNICAL OBJECTIVE: V-B-4 SOLDIER-MACHINE PERFORMANCE ENHANCEMENT

PROGRESS:

"Improved procedures for investigating aircrew coordination errors in Army aviation accidents," supplement to DA Pamphlet 385-95	FY91
Identification of critical dimensions of cockpit teamwork	FY91
Aircrew coordination training program outline	FY91

FY92/93 MILESTONES:

Demonstration and evaluation of a prototype unit-level training package	FY92
Extension of research to cover aviation units assigned in FY91 as part of Operation Desert Storm	FY93

PROJECTED PRODUCTS:

Prototype flight management system for improving intra-crew information sharing (simulator-based)	FY92
Prototype flight management system for improving cockpit resource management (simulator-based)	FY93
Prototype flight management system for improving emergency recognition and management (simulator-based)	FY94
In-flight prototype flight management system for improving coordination and performance during terrain flight and NVD conditions	FY95-96

REQUIREMENT/MEMORANDUM OF AGREEMENT: Pending

1216: MISSION AND PERFORMANCE-BASED ORGANIZATIONAL DESIGN

ARMY NEED:

An exploratory development program just concluding has identified useful methods for predicting and measuring mental workload in Army situations. In parallel, a PC-based method to guide unit design, Systematic Organization Design (SORD), was developed and is being fielded through TRADOC schools. While SORD improves unit design through improved adherence to procedures, units in the smaller future Army must ensure that each soldier is fully task-loaded but without overloads that would affect mission success.

APPLICATION/PRODUCT OBJECTIVE:

To develop methods to design units that consider soldier and crew workload and other soldier performance factors. Methods will be PC-based for use in organization design and evaluation to support combat, materiel, and training developments.

ARMY IMPACT/PAYOFF:

The Army's need to successfully respond to projected increases in mission requirements with fewer resources can ill afford unnecessary developmental risks. Yet, in more technologically complex systems and more sophisticated force structures, soldier-oriented issues and concerns become increasingly critical risk factors in achieving the combat capabilities to deter and defeat the threat. Validated techniques and procedures for assessing and utilizing soldier-related factors will permit combat and materiel developers to identify and resolve critical unit design and soldier-system interface problems early in the force development and system acquisition processes.

PROPONENT(S)/SPONSOR(S): TRADOC (CAC-CD)

6.3A PRIORITY: 15 OF 30

FUNDING:	FY92	FY93	**END DATE:** FY95
6.3A	206	122	

PERFORMING ELEMENT:

FORT BLISS FIELD UNIT
SYSTEMS RESEARCH LABORATORY

ATBMP SCIENTIFIC AND TECHNICAL OBJECTIVE: V-B-3 MANPRINT ASSESSMENT TECHNIQUES

PROGRESS: New Start

FY92/93 MILESTONES:

Broadening of workload concepts and findings to performance-based organizational design	FY92
Assessment of workload methodologies for application to planned organizational downsizing	FY93
Technical Report, Workload Applied to Performance-Based Organizational Design	FY93

PROJECTED PRODUCTS:

Research Note, Workload Distribution Concepts Applied to Organizational Downsizing	FY93
Methods for workload and performance based unit design and evaluation (PC-based)	FY95

REQUIREMENT/MEMORANDUM OF AGREEMENT: Pending

1217: FORWARD AREA AIR DEFENSE (FAAD) PERFORMANCE IN A CHEMICAL ENVIRONMENT

ARMY NEED:

Soldiers must be able to operate in a chemically-contaminated environment. The chemical protective ensemble is bulky and increases heat stress. The effects of the ensemble are differential across tasks and are affected by many variables. Commanders need to know the effects of fighting in a chemical environment and how to counter those effects which could impair mission success.

APPLICATION/PRODUCT OBJECTIVE:

Field tests have shown Stinger gunner engagement performance to be impaired by MOPP 4 protective clothing. The objectives of this project are to (1) quantify the FAAD team performance decrement experienced during sustained operations on the integrated battlefield, (2) determine how that team performance decrement affects adherence to AirLand Battle-Future doctrine, (3) identify near-term methods, procedures, and materiel to increase team ability to sustain mission capability of FAAD systems, and (4) generalize to other battlefield operating systems.

ARMY IMPACT/PAYOFF:

The Physiological and Psychological Effects of the NBC Environment and Sustained Operations on Systems in Combat (P2NBC2) program researches the impact of NBC and extended operations on combat performance. The products of this task will be used by the P2NBC2 program to address the physiological and psychological effects of NBC and sustained operations on FAAD and other systems in combat.

PROPONENT(S)/SPONSOR(S): TRADOC (USAADASCH)

6.3A PRIORITY: 26 OF 30

FUNDING:	FY92	FY93	**END DATE:** FY94
6.3A	226	250	

PERFORMING ELEMENT:

FORT BLISS FIELD UNIT
SYSTEMS RESEARCH LABORATORY

ATBMP SCIENTIFIC AND TECHNICAL OBJECTIVE: V-B-4 SOLDIER-SYSTEM PERFORMANCE ENHANCEMENT

PROGRESS: New Start

FY92/FY93 MILESTONES:

Conduct research on FAAD engagement performance during sustained operations in a chemical environment	FY92
Conduct research on decentralized situation analyses and engagement decisions by FAAD leaders in a chemical environment	FY93

PROJECTED PRODUCTS:

Soldier Extended Eye-Piece and engagements in a chemical environment final test report for (USACMLS) P2NBC2	FY92
FAAD engagement performance during sustained operations in a chemical environment final test report for (USACMLS) P2NBC2	FY93
MOPP 4 effects on decentralized situation analyses and engagement decisions by FAAD leaders - final test report	FY93
Identification and validation of methods, procedures, and materiel to increase team ability to sustain mission capability in chemical environments	FY94

REQUIREMENT/MEMORANDUM OF AGREEMENT: Pending

1219: IMPACT OF DOCTRINE DESIGN ON SOLDIER PERFORMANCE IN COMBAT

ARMY NEED:

The Army has undertaken a number of soldier-related initiatives to improve combat effectiveness with constrained resources: (1) The MANPRINT program improves battlefield effectiveness by optimizing the integration of soldiers with weapon systems technology, and (2) Training centers (NTC, JRTC, and other combat training centers) provide soldiers in a unit context more comprehensive and realistic combat experience. Doctrine is the mechanism that ties soldier capabilities, materiel, and training into units that provide combat power. Methods are needed to maximize the impact of doctrine on combat power by ensuring that soldier capabilities and issues are systematically addressed in the doctrine development process.

APPLICATION/PRODUCT OBJECTIVE:

To develop analytical techniques, procedures, and information to enable the systematic consideration of soldier capabilities and performance in the design and development of doctrine. This research task will, in part, apply the exploratory development products pertaining to force structure design parameters and soldier performance in the TRADOC Concept-Based Requirements System (CBRS).

ARMY IMPACT/PAYOFF:

The focus of this program is on improving the processes of the design of the doctrine that serves as the integrating factor in the production of combat power. This research will make soldier-related initiatives more effective and Army modernization more affordable and tractable. Doctrine development will be conducted in full consideration of identified soldier MPT and performance constraints and capabilities.

PROPONENT(S)/SPONSOR(S): TBD

6.3A PRIORITY: TBD

FUNDING:	FY92	FY93	**ENDING DATE:** FY97
6.3A	0	317	

PERFORMING ELEMENT:

MANNED SYSTEMS GROUP
SYSTEMS RESEARCH LABORATORY

PROGRESS: New Start

FY92/93 MILESTONES:

Design concepts completed for doctrine development products	FY93
Coordination with Future Battle Lab	FY93

PROJECTED PRODUCTS:

Aids for the management of doctrine development products	FY93
Delineation of soldier performance in combat factors and their impact on doctrine and force modernization	FY97

REQUIREMENT/MEMORANDUM OF AGREEMENT:

Command: DCS for Doctrine
Title: Doctrinal Literature
Eff. Date: 03 Nov 88

1304: ENHANCING COMMAND STAFF PERFORMANCE IN COMBAT OPERATIONS

ARMY NEED:

The Army is responding to a greater diversity of missions, more uncertain threats, and a wider array of potential battlefield environments with increased automation, decreased manpower, and decentralization of the Army's Command and Control (C2) systems. Rapid, complete, and accurate information and decision aiding systems are needed to provide a performance advantage for the anticipated dynamic political climates and tactical situations. Human performance capabilities and compatibilities with these systems must be precisely addressed and used by the combat developers.

APPLICATION/PRODUCT OBJECTIVE:

The objective of this application is to generate empirically validated soldier-centered requirements for emerging C2 system applications such as the Maneuver Control System (MCS), the Force Level Control System (FLCS), Functional Command Post (FCP), and embedded tactical decision aids. Requirements will be generated and evaluated based on soldier and staff performance levels. The objective is to ensure robust tactical planning and synchronized execution by using the capabilities of the C2 systems to increase the use of METT-T factors.

ARMY IMPACT/PAYOFF:

Successful integration of improved staff procedures, C2 technology, soldier quality, and organizational structure will ensure that future tactical commanders are supported with an effective, efficient, and resilient system for planning and executing combat operations.

PROPONENT(S)/SPONSOR(S): TRADOC (CAC-CD)

6.3A PRIORITY: 21 OF 30

FUNDING:	FY92	FY93	**END DATE:** FY93
6.3A	446	412	

PERFORMING ELEMENT:

FORT LEAVENWORTH FIELD UNIT
SYSTEMS RESEARCH LABORATORY

ATBMP SCIENTIFIC AND TECHNICAL OBJECTIVE: V-B-4 SOLDIER-SYSTEM PERFORMANCE ENHANCEMENT

PROGRESS:

Analyzing tactical courses of action using structured procedures and automated aids	FY90
Decision Aiding and methodological support for Force Level Control System (FLCS) requirements	FY90
Concepts for Maneuver Control System unit task organization	FY90
Evaluation of selected staff planning aids: AirLand Battle Management (ALBM) forces	FY90
Evaluation of an engineering copier for command post use	FY90
Guidelines for specifying human computer dialogue for C2 systems	FY90
Staff estimate procedures (Coordinating Draft FM 101-5)	FY90
User interface design and assessment guidance for Maneuver Control System	FY90
Workspace assessment of a battalion task force command post	FY90
Workspace design handbook for standardized command posts	FY90

FY92/93 MILESTONES:

Generate aiding concepts for terrain management	FY92
Complete guidelines for tactical planning aids	FY92
Transition planning aid requirements for MCS V.12	FY93

PROJECTED PRODUCTS:

Aiding concepts for terrain management	FY92
Guidelines for tactical contingency planning	FY92
Planning aid requirements for MCS V.12	FY93

REQUIREMENT/MEMORANDUM OF AGREEMENT:

Command: TRADOC (CAC-CD)
Title: Development and Implementation of the Future Battle Laboratory
Eff. Date: 30 Jun 89

1307: EVALUATING COMMAND POST PERFORMANCE

ARMY NEED:

Improving and maintaining the effectiveness of multi-echelon Army command and control systems depends upon the availability of objective, quantitative methods for assessing command staff performance and contributions to battle command operations. To date, the Army lacks objective measurement systems and standards by which to evaluate staff decision processes and information flow in the context of field exercises, training exercises, hardware development activities, and laboratory tests. The development and validation of a measurement system and associated performance database will assist the Army in (1) ensuring the readiness of its operational command staffs and (2) measuring, evaluating, and developing lessons learned on the combat contributions of specific components of the Army's multi-billion dollar Army Tactical Command and Control System (ATCCS). The research task supports the total Army goals of readiness, leadership, materiel, and training, plus the TRADOC goals of doctrine, training, and leader development.

APPLICATION/PRODUCT OBJECTIVE:

To develop and implement a prototype of a command and control performance database and an analytic model of staff performance to support the development of lessons learned and the objective evaluation of C2 hardware systems, staff procedures, and organizations associated with the Army Tactical Command and Control System.

ARMY IMPACT/PAYOFF:

This development will provide the Army with an objective method for assessing C2 effectiveness in division and corps exercises and for assessing the benefit of proposed new doctrine and systems for C2.

PROPONENT(S)/SPONSOR(S): DA (OTEA); TRADOC (CAC-T, CAC-CD)

6.3A PRIORITY: 1 OF 30

FUNDING:	FY92	FY93	**END DATE:** FY95
6.3A	620	725	

PERFORMING ELEMENT:

FORT LEAVENWORTH FIELD UNIT
SYSTEMS RESEARCH LABORATORY

ATBMP SCIENTIFIC AND TECHNICAL OBJECTIVE: V-B-4 SOLDIER-SYSTEM PERFORMANCE ENHANCEMENT

PROGRESS:

Army Command and Control Evaluation System (ACCES) application on three division CPXs	FY89
ACCES applications on one corps and three division CPXs	FY90
Battle Command Training Program (BCTP) Database System Prototype	FY90
ACCES Conceptual Model and Data Definition Revisions	FY91

FY92/93 MILESTONES:

ACCES handbook, forms, and instructional materials revision	FY92
Improved ACCES procedures for data collection and analysis	FY92
Final ACCES handbook, forms, and instructional materials	FY93
Improved ACCES procedures for data collection and analysis	FY93

PROJECTED PRODUCTS:

Baseline data to support ATCCS Evaluation	FY92
Prototype multi-media relational database of C2 performance measures and observations to support lessons learned	FY93
Improved C2 performance measurement process	FY94
C2 Performance Database	FY94
Analytical model of (ATCCS) staff performance and organizations	FY95

REQUIREMENT/MEMORANDUM OF AGREEMENT:

Command: DA (OTEA)
Title: ACCES Application During the ASAS FDTE
Eff. Date: 30 Dec 88

Command: TRADOC (CAC-T)
Title: Development, Maintenance and Utilization of a Database Containing Corps and Division Training Performance and Battle Evaluation
Eff. Date: 13 Mar 89

Command: TRADOC (CAC-CD)
Title: Development of Performance Measurement Methodology for Corps, Division, and Brigade Command Posts
Eff. Date: 11 Jul 86

1309: PROGNOSTIC MODELS OF MILITARY INTELLIGENCE (MI) SOLDIER INFORMATION PROCESSING PERFORMANCE

ARMY NEED:

Combating new threats by using new technologies to leverage human performance is placing new requirements on soldiers' information processing and data analysis abilities. The cognitively complex tasks are not well understood and the impact of proposed force modernization changes on soldiers' performance and manpower demands are unknown. Already new sophisticated systems proposed for IEW threaten to increase, rather than reduce, demands on the soldier. Even the complexity of handling information for target acquisition has serious implications regarding skill level and manpower requirements. With the expected reduction in training resources and the requirement to downsize personnel resources, the Army must determine how to best utilize soldier-machine information processing capabilities.

APPLICATION/PRODUCT OBJECTIVE:

Generate predictive models of soldiers' information processing performance and develop computer simulation techniques which can be used to make quantitative judgments on how to increase battlefield effectiveness through optimal use of soldier-machine information processing capabilities.

ARMY IMPACT/PAYOFF:

Quantitative criteria and standards can significantly increase battlefield effectiveness through improved use of materiel and human information processing resources, and can significantly decrease the cost incurred by implementing inappropriate force modernization changes.

PROPONENT(S)/SPONSOR(S): TRADOC (USAICS)

6.3A PRIORITY: 19 OF 30

FUNDING:	FY92	FY93	**END DATE:** FY97
6.3A	774	779	

PERFORMING ELEMENT:

FORT HUACHUCA FIELD UNIT
SYSTEMS RESEARCH LABORATORY

ATBMP SCIENTIFIC AND TECHNICAL OBJECTIVE: V-B-5 SOLDIER REQUIREMENTS SPECIFICATION FOR IEW

PROGRESS:

Evaluated measures of effectiveness for information production	FY89
Established an error framework for capturing information production performance	FY90
Determined the feasibility of simulating information production performance	FY91

FY92/93 MILESTONES:

Experimentally verify information production performance model	FY92
Develop measures for assessing information management performance	FY92
Generate techniques to model information management performance	FY93

PROJECTED PRODUCTS:

Measures of performance for evaluating information management strategies	FY92
Method to study impact of information production performance	FY93
Predictive model of information production performance	FY94
Predictive model of information management performance	FY95
Method for evaluating value-added of processing changes	FY96
Analyst tool to assess impact of information processing demands	FY97

REQUIREMENT/MEMORANDUM OF AGREEMENT:

Command:	TRADOC (USAICS)
Title:	Behavioral Research in Support of the U.S. Army Intelligence Center and School
Eff. Date:	23 Aug 90

1401: SOLDIER-SYSTEM CONSIDERATIONS IN FORCE DEVELOPMENT TESTING

ARMY NEED:

The Army is challenged with every new budget to justify the expenses needed to attract and retain quality soldiers. The conduct of tests solely to determine the relationship between soldier characteristics (e.g., mental category) and the tactical performance of a variety of materiel systems is prohibitively expensive. This research, however, minimizes this problem by exploiting the opportunity provided by operational tests to collect soldier-in-the-loop performance data on the new weapons or other systems while they are being tested.

APPLICATION/PRODUCT OBJECTIVE:

To obtain soldier performance data from soldier-in-the-loop materiel tests that can be related to soldier characteristics; to improve the operational test process; to identify MANPRINT problems of new materiel undergoing user testing; to recommend solutions to these identified problems in the MANPRINT domains of manpower, personnel, and training; and to refer problems in the MANPRINT domains of human engineering, safety, and health hazards to the appropriate agency for corrective action.

ARMY IMPACT/PAYOFF:

For some weapon systems, an increase in gunner aptitude mental category has been found to improve tactical performance 50 to 100%. Documenting such relations whenever possible builds the Army's case for spending for soldier quality. It also enables force designers to knowledgeably place the available mental category soldiers in those MOSs with the greatest battlefield benefit. The second impact of this research is in the operational testing process itself. With T&E costs taking 10% of the weapons acquisition budget, more effective, efficient testing saves money - money that can be spent on more systems.

PROPONENT(S)/SPONSOR(S): TRADOC (TEXCOM)

6.3A PRIORITY: 14 OF 30

FUNDING:	FY92	FY93	**END DATE:** FY95
6.3A	818	915	

PERFORMING ELEMENT:

FORT HOOD FIELD UNIT
SYSTEMS RESEARCH LABORATORY

PROGRESS:

MANPRINT Evaluation of Planned Improvement Program (PIP) of 0Q-290V Electronic Equipment Test Facility (EETF)	FY89
MANPRINT Evaluation of SINCGARS during Early User Test and Evaluation (EUT&E)	FY89
MANPRINT Evaluation: AN/TRC-170 Digital Troposcatter Radio System	FY89
Summary of Research on Combat Vehicle Identification (CVI)	FY89
Target Acquisition and Analysis Training System: Effects of Motion on Performance in the CVI Training Program	FY89
Theater Army Medical Management Information System: A MANPRINT Evaluation	FY89
Training Level, Aptitude and System Performance on the AN/TRC 170: Weighted and Unweighted Correlational Analysis	FY89
HF Performance Data for Future Forward Area Air Defense System (FAADS)	FY89
SINCGARS ABN MANPRINT Evaluation	FY89
Soldier Performance as a Function of Stress and the Soldier's Load	FY89
MANPRINT data collected and analyzed during Regency Net Test	FY90
MANPRINT Evaluation of the High Mobility Multipurpose Wheeled Vehicle Heavy Variant (HMMWV-HV)	FY90
Relationship Between Vehicle Identification Performance and ASVAB	FY90
CTAS II MANPRINT Evaluation	FY90

FY92/93 MILESTONES:

SINCGARS Second Source IOT&E (1st Quarter)	FY92
Mobile Subscriber Equipment (MSE) Command Post Exercise	FY92

(CPX) (2nd Quarter)

Palletized Load System IOT&E (2nd Quarter)	FY92
Combat Service Support Computer System IOT&E (2nd Quarter)	FY92
Army Tactical Command and Control System (ATCCS) EUT&E (3rd Quarter)	FY92
Aviation Night Vision Heads Up Display IOT&E (3rd Quarter)	FY92
Aircrew Integrated Helmet System (AIHS) IOT&E (3rd Quarter)	FY92
UAV-Short IOT&E (3rd Quarter)	FY92
Maneuver Control System IOT&E (4th Quarter)	FY92
Army Tactical Command and Control System (ATCCS) FDT&E (1st Quarter)	FY93
Forward Area Air Defense C3I IOT&E (4th Quarter)	FY93

PROJECTED PRODUCTS:

MANPRINT Evaluation of Regency Net System	FY92
Functionalized Command Post Computer Model	FY92
Systems Target Acquisition Computer Model	FY92
MANPRINT Evaluation of Palletized Load System	FY92
MANPRINT Evaluation of SINCGARS Second Source IOT&E	FY92
MANPRINT Evaluation (Research Report) of UAV-Short IOT&E	FY92
MANPRINT Evaluation of Aircrew Integrated Helmet System	FY92
MANPRINT Evaluation of Aviation Night Vision Heads-up Display	FY92
MANPRINT Evaluation of ATCCS during FDT&E 1	FY93
MANPRINT Evaluation of CSSCS during IOT&E	FY93
MANPRINT Evaluation of FAADC3I during IOT&E	FY93
Optimized methods for incorporating MPT considerations in new materiel testing	FY95

REQUIREMENT/MEMORANDUM OF AGREEMENT:

Command: TRADOC (TEXCOM)
Title: MOU between ARI and TCATA
Eff. Date: 11 May 81

Advanced Development

PROGRAM AREA 2: Manning and Leading the Force

2104: ENHANCING RECRUITING PERFORMANCE

2207: SELECTION AND CLASSIFICATION TESTS FOR CRITICAL MOS

2208: BUILDING THE CAREER FORCE

2209: SPECIALIZED MOS CLASSIFICATION AND ARMY-WIDE SELECTION METHODS

2214: SPECIAL FORCES CAREER ENHANCEMENT

2302: FAMILY-BASED SOLDIER RETENTION AND READINESS

2402: ARMY CIVILIAN SUPERVISORY SELECTION METHODS

2403: SENIOR LEADER DEVELOPMENT

2104: ENHANCING RECRUITING PERFORMANCE

ARMY NEED:

The Army needs to enhance recruiter productivity. Although accession missions are being reduced, resources are being cut even as the eligible population continues to decline through 1995 and will remain below 1985 levels through 2010. Although the recruiting mission will continue to decline during transitioning, the experienced recruiting force is being cut even more drastically. The percentage of contracted recruits who attrit from the Delayed Entry Program (DEP) before accession has continually increased.

APPLICATION/PRODUCT OBJECTIVE:

Enhance recruiter performance through improved methods of training, assignment, and selection. Develop and evaluate formal and on-the-job training programs for recruiters in sales oriented areas. Develop/test/validate recruiting incentives and marketing appeals both for short-term effects (recruiting now) and long-term effects (retention influences on future recruiting needs). Develop and test/validate program alternatives to reduce DEP attrition.

ARMY IMPACT/PAYOFF:

Force quality can be sustained with fewer resources while recruiting from an increasingly competitive market. Recruiter effectiveness can be enhanced by the development of new, less costly recruiting initiatives and by making improvements to existing recruiting programs.

PROPONENT(S)/SPONSOR(S): ODCSPER (USAREC)

6.3A PRIORITY: 6 OF 30

FUNDING:	FY92	FY93	**END DATE:** FY94
6.3A	142	326	

PERFORMING ELEMENT:

MANPOWER AND PERSONNEL POLICY RESEARCH GROUP
MANPOWER AND PERSONNEL RESEARCH LABORATORY

ATBMP SCIENTIFIC AND TECHNICAL OBJECTIVE: V-B-2 RECRUITING AND RETENTION OF QUALITY SOLDIERS

PROGRESS:

1986 New Recruit Survey data collection, database development, and analysis	FY86
New Recruit Surveys operationalized by U.S. Army Recruiting Command (USAREC)	FY87
Analysis of basic recruiter training program effectiveness	FY88
Army advertising effectiveness analyses	FY88
Army advertising message content analyses	FY88
Evaluation of an Army recruiter selection program	FY88
1989 ARI Recruit Experience Tracking Survey data collection and database development	FY89
1990 Army Career Satisfaction Survey (ACSS) database development, and analysis	FY90
Analysis of USAREC Recruiter Training Program needs	FY91
Analysis of Army Recruiter sales techniques	FY91
Army Career Transitions Survey data collection, database development, and analysis	FY91
Surveys of Total Army Military Personnel data collections, database development, and analysis	FY91

FY92/93 MILESTONES:

Army Career Transitions Survey institutionalized by DA	FY92
Army Alumni Survey questionnaire field-test	FY92
Parental Influence validation data collection	FY92
Army Alumni Survey operational questionnaire	FY92

Parental Influence model	FY93
Downsizing effects on recruiting market data collection	FY93

PROJECTED PRODUCTS:

Improved Recruiting, Training and Marketing Tools for Army Recruiters	FY94

REQUIREMENT/MEMORANDUM OF AGREEMENT:

Command: ODCSPER (USAREC)
Title: Research in Support of USAREC OJT
Eff. Date: 16 Oct 90

2207: SELECTION AND CLASSIFICATION TESTS FOR CRITICAL MOS

ARMY NEED:

Success in various critical Military Occupational Specialties (MOS) requires specific traits beyond those measured by current Army personnel tests. Tank and anti-tank gunnery, for example, require eye-hand coordination and spatial abilities. ARI has developed and experimentally validated a battery of new tests that measure many of these personal attributes. At present, the Army does not have a program for evaluating the new tests in an operational setting.

APPLICATION/PRODUCT OBJECTIVE:

To evaluate the applicability of newly-developed perceptual, psychomotor and biographical/temperament tests for particular selection and classification purposes.

ARMY IMPACT/PAYOFF:

The designed performance capability of critical weapon systems is often not achieved because of skill deficiencies in the human maintainers and operators. Cost-effective personnel tests, when implemented, will significantly reduce the gap between designed and actual system performance.

PROPONENT(S)/SPONSOR(S): ODCSPER (DMPM)

6.3A PRIORITY: 16 OF 30

FUNDING:	FY92	FY93	**END DATE:** FY93
6.3A	248	157	

PERFORMING ELEMENT:

SELECTION AND CLASSIFICATION TECHNICAL AREA
MANPOWER AND PERSONNEL RESEARCH LABORATORY

ATBMP SCIENTIFIC AND TECHNICAL OBJECTIVE: V-B-1 SOLDIER ASSIGNMENT

PROGRESS:

Evaluation of psychomotor and spatial tests for selecting Air Defense Gunners	FY89
Paper-and-Pencil test battery developed for pre-service screening the Military Entrance Processing Stations (MEPS)	FY89
Evaluation of tests for selecting soldiers for Excellence in Armor Program	FY89
Testing psychomotor and spatial abilities to improve selection of TOW gunners	FY89
Joint Service test battery fielded incorporating six psychomotor/spatial tests	FY90
Evaluated test battery for selecting Bradley gunners	FY90
Preliminary evaluation of Assessment of Background and Life Experiences (ABLE) instrument for Ranger selection	FY91
Preliminary findings on effects of practice, orders, and instructions on scores on computerized tests	FY91

FY92/93 MILESTONES:

Development and administration of new experimental forms for temperament, spatial tests	FY92
Development of procedures for addressing effects of practice, order and instructions on computerized tests	FY93

PROJECTED PRODUCTS:

Recommended forms of perceptual, psychomotor and biographical/temperament tests for selection	FY93

REQUIREMENT/MEMORANDUM OF AGREEMENT: Pending

2208: BUILDING THE CAREER FORCE

ARMY NEED:

As the overall size of the Army shrinks, it becomes even more important that those who enter and those who remain in the Army are those most qualified to perform the activities required. Current selection and classification procedures are limited. They predict some, but not all, aspects of training and first tour performance. They are not oriented toward building an effective corps of junior NCO.

APPLICATION/PRODUCT OBJECTIVE:

This project is the culmination of a multi-stage research effort to develop an improved personnel system which will (1) select the right people, (2) put these people in the jobs they are most suited for, and (3) retain and promote the right people.

ARMY IMPACT/PAYOFF:

This effort will substantially improve a selection and classification system which ARI recently estimated produces annual benefits to the Army of $250 million in terms of improved performance. Benefits will also accrue from improved promotion and reenlistment decisions. Those soldiers who are chosen as junior NCO provide leadership and continuity critical to the Army's success on the battlefield. This effort will link those decisions to proven indicators of future success.

PROPONENT(S)/SPONSOR(S): ODCSPER (DMPM)

6.3A PRIORITY: 13 OF 30

FUNDING:	FY92	FY93	**END DATE:** FY94
6.3A	1548	1714	

PERFORMING ELEMENT:

SELECTION AND CLASSIFICATION TECHNICAL AREA
MANPOWER AND PERSONNEL RESEARCH LABORATORY

ATBMP SCIENTIFIC AND TECHNICAL OBJECTIVE: V-B-1 SOLDIER ASSIGNMENT

PROGRESS:

Calculated test and performance scores on longitudinal sample	FY90
Developed preliminary model and equations for predicting second tour performance at initial entry	FY91
Developed model and preliminary equations for predicting training performance at initial entry	FY91

FY92/93 MILESTONES:

Identify best predictors of first tour performance	FY92
Complete administration of refined second tour measures	FY92
Develop formal model of second tour performance	FY93
Link new selection and classification tests to second tour performance	FY93
Identify best predictors of in-service attrition	FY93

PROJECTED PRODUCTS:

Validation of existing and new selection and classification tests against first and second tour performance	FY94
Recommended set of measures for predicting second tour performance	FY94

REQUIREMENT/MEMORANDUM OF AGREEMENT: Pending

2209: SPECIALIZED MOS CLASSIFICATION AND ARMY-WIDE SELECTION METHODS

ARMY NEED:

The Army has a continuing human resource concern for its high leverage, critical Military Occupational Specialties (MOS). There is a strong desire for tailored selection and classification (S&C) tools to make the best matches between soldiers' abilities and job requirements. The solutions are increasingly technical and need to be achieved within the DA ODCSPER manpower, personnel and resources constraints while meeting the needs of the MOS Proponents.

APPLICATION/PRODUCT OBJECTIVE:

The objective of this research is twofold: First, to conduct research on methods for determining which MOS are likely to have special S&C needs and to perform research with the MOS to meet those needs; and, second, on a larger scale to perform research dealing with the Army's selection and classification system as a whole in order to identify the potential for more efficient S&C procedures.

ARMY IMPACT/PAYOFF:

Improved S&C procedures for MOS such that each individual's abilities will be optimally matched to the job requirements. This improved matching will result in the best use possible of the Army's human resources (minimum attrition and optimum job performance).

PROPONENT(S)/SPONSOR(S): ODCSPER (DMPM)

6.3A PRIORITY: 17 OF 30

FUNDING:	FY92	FY93	**END DATE:** FY97
6.3A	457	570	

PERFORMING ELEMENT:

SPECIAL SELECTION RESEARCH GROUP
MANPOWER AND PERSONNEL RESEARCH LABORATORY

ATBMP SCIENTIFIC AND TECHNICAL OBJECTIVE: V-B-1 SOLDIER ASSIGNMENT

PROGRESS:

Methods identified for determining which MOS in a job set would benefit from special S&C	FY90
Develop plans for testbed using concept of "job sets" for efficiency in recruiting and training (JSERT)	FY91

FY92/93 MILESTONES:

Implement testbed for JSERT concept	FY92
Compare Services' existing S&C systems and DOD's proposed modifications with the Army's system and plans	FY93

PROJECTED PRODUCTS:

Methodology for predicting MOS with special selection needs	FY94
Template for operationalizing JSERT	FY96
Report on pros and cons of changes to the current selection and classification process	FY97

REQUIREMENT/MEMORANDUM OF AGREEMENT: Pending

2214: SPECIAL FORCES CAREER ENHANCEMENT

ARMY NEED:

Special Operations Forces work in a complex environment of rapid response, multi-lingual, multi-ethnic forces in various terrains with high family stress. The Army needs research which delineates procedures for recruitment, screening and cross-cultural communication skill development of Special Forces soldiers, while raising retention probability.

APPLICATION/PRODUCT OBJECTIVE:

Develop a profile of high performing Special Operations Forces soldiers. Provide Army planners with information and methods for recruitment, selection, training and retention of high performing soldiers in Special Operations Forces units.

ARMY IMPACT/PAYOFF:

This research will provide U.S. Army military leadership with critical and crucial information to increase readiness, retention, morale and unit performance of Special Forces units.

PROPONENT(S)/SPONSOR(S): TRADOC (USASOC)

6.3A PRIORITY: 8 OF 30

FUNDING:	FY92	FY93	**END DATE:** FY94
6.3A	201	310	

PERFORMING ELEMENT:

PERSONNEL UTILIZATION TECHNICAL AREA
MANPOWER AND PERSONNEL RESEARCH LABORATORY

ATBMP SCIENTIFIC AND TECHNICAL OBJECTIVE: V-B-1 SOLDIER ASSIGNMENT

PROGRESS:

Evaluated utility of spatial tests for screening candidates to Special Forces Assessment and Selection (SFAS) program	FY91

FY92/93 MILESTONES:

U.S. Army Special Operations Command needs analysis	FY92
Longitudinal data base on Special Forces assessment	FY92-93
Interviews and surveys to determine high performing Special Forces soldier	FY92-93
Evaluate utility of existing screening measures for predicting success in SFAS	FY92
Recruitment methods for Special Forces	FY92
Evaluate existing screening measures forpredicting success in the Special Forces Qualification Course	FY93
Evaluate utility of new screening measures for predicting success in the Special Forces Qualification Course	FY93

PROJECTED PRODUCTS:

Model of High Performing Special Operations soldier	FY93
Career Decision Aid for soldier and recruiter	FY93
Improved set of Special Forces screening and selection measures	FY94
Determination of which Special Forces screening measures best predict job performance	FY94

REQUIREMENT/MEMORANDUM OF AGREEMENT: Pending

2302: FAMILY-BASED SOLDIER RETENTION AND READINESS

ARMY NEED:

Approximately 16% of total Army Expenditures are for family/ Quality of Life programs. In an age of scarce resources and reduced manpower, the Army needs even better information on which policies, programs, and practices serve family needs and historic Army interests such as retention of quality individuals and meeting readiness requirements. According to GEN Vuono (1990): "Only by caring for our soldiers and their families will we be able to meet our most essential imperative, that of attracting and retaining high quality men and women."

APPLICATION/PRODUCT OBJECTIVE:

To develop databases, models, program evaluation technologies and policy options that assist the Army to retain quality soldiers, improve soldier and unit readiness, and increase family adaptation to Army life.

ARMY IMPACT/PAYOFF:

(1) Improved methodology for increasing family adaptation to Army life, (2) enhanced retention planning capabilities for managing evolving force changes, (3) better focused design and evaluation of retention interventions for use by DA policy makers and retention NCOs to increase the retention of high-performing soldiers, and (4) improved measures of individual and unit readiness.

PROPONENT(S)/SPONSOR(S): ODCSPER (USACFSC)

6.3A PRIORITY: 5 OF 30

FUNDING:	FY92	FY93	**END DATE:** FY93
6.3A	346	905	

PERFORMING ELEMENT:

PERSONNEL UTILIZATION TECHNICAL AREA
MANPOWER AND PERSONNEL RESEARCH LABORATORY

ATBMP SCIENTIFIC AND TECHNICAL OBJECTIVE: V-B-2 RECRUITING AND RETENTION OF QUALITY SOLDIERS

PROGRESS:

1987 Annual Survey of Army Families	FY88
Dual Army career couples: Job attitudes and career intentions	FY88
Families and readiness: An examination of the 1985 DOD Survey of Enlisted Personnel	FY88
Analysis of families as decision-making units	FY89
Family Adaptation to Relocation	FY89
The Determinants of Job Satisfaction: A multidisciplinary, multivariate analysis	FY89
Spouse employment in the Army	FY90
Family adaptation among military personnel and families	FY90
Definition and measure of individual and unit readiness	FY90
Building strong Army communities	FY90
Young single soldiers	FY91
Adjustment to family separation	FY91
Need for and access to Army community support	FY91
Impact of family and other factors on retention	FY91
Relation of family factors to individual readiness	FY91

FY92/93 MILESTONES:

Installation leadership practices that promote family support for the Army	FY92
Preliminary models of soldier retention	FY92
Family Data Base Completion	FY92
Prototype Models of Family Decision Making	FY93

PROJECTED PRODUCTS:

Models for predicting family impact on individual and unit readiness	FY93
Models of how community services estimating soldier retention and readiness	FY93

REQUIREMENT/MEMORANDUM OF AGREEMENT:

Command: ODCSPER (USACFSC)
Title: Sponsorship of ARI Army Family Research
Eff. Date: 01 Dec 86 (updated: 07 Jan 88)

2402: ARMY CIVILIAN SUPERVISORY SELECTION METHODS

ARMY NEED:

Modernization of the Army's civilian personnel management system is essential in order to preserve Total Army effectiveness in the face of the downsizing that will occur over the next several years. Major needs include supervisor selection tools and procedures, civilian leader training, and data bases to aid in tracking decisions on policies and programs for managing the Army's civilian work force.

APPLICATION/PRODUCT OBJECTIVE:

Selection tools and procedures to aid the Army in identifying, selecting, training, and developing high-quality supervisors and managers for the civilian work force. This research will develop selection tools for first- and second-line supervisors, and will establish a longitudinal data base for tracking the impact of policies and programs within the civilian work force.

ARMY IMPACT/PAYOFF:

Supervisor selection tools will improve the leadership of the Army's civilian component. Improved supervisory leadership, together with systematic improvement of the Army's civilian personnel management system, will greatly enhance the ability of the Army to attract and retain quality personnel and to manage those personnel in order to achieve higher levels of productivity at the same or lower personnel cost.

PROPONENT(S)/SPONSOR(S): ODCSPER (CP)

6.3A PRIORITY: 27 OF 30

FUNDING:	FY92	FY93	**END DATE:** FY93
6.3A	608	689	

PERFORMING ELEMENT:

EXECUTIVE DEVELOPMENT RESEARCH GROUP
MANPOWER AND PERSONNEL RESEARCH LABORATORY

PROGRESS:

Analysis of tasks performed by civilian supervisors	FY88
Assessment of validity of current Department of the Army Information Pertaining to Supervisor Selection and Training	FY89
Field tested first-line supervisor selection tools	FY91
Design longitudinal civilian survey data base	FY91

FY92/93 MILESTONES:

Civilian longitudinal work force data base	FY92
Second-line supervisor selection tools developed	FY92
Validation of first-line supervisor selection tools complete	FY92

PROJECTED PRODUCTS:

Validated first-line supervisor selection tools	FY93
Field-tested second-line supervisor selection tools	FY93
Longitudinal civilian survey (1988/1990/1992) data base	FY93

REQUIREMENT/MEMORANDUM OF AGREEMENT:

Command: ODCSPER (CP)
Title: Research on DA Civilian Leadership and Management
Eff. Date: 13 Apr 88

2403: SENIOR LEADER DEVELOPMENT

ARMY NEED:

AirLand Battle doctrine envisions a spectrum of warfare presenting major leader development challenges, among them the earlier development of thinking skills needed to read the battlefield and make independent decisions. These challenges are compounded by the requirement to maintain a high state of combat readiness in the face of severely declining resources and a shrinking Army. The Army need is for improved leader development, based on systematic analysis of the cognitive skills of senior leaders, and technologies to facilitate earlier acquisition of these skills.

APPLICATION/PRODUCT OBJECTIVE:

A theory-based understanding of leader development at mid and senior levels. A research data base developed from senior officer interviews for Army War College instructional use. Special texts on mid-level and strategic leadership. Technology for early assessment and development (via microprocessor-based simulations) of thinking skills required at senior levels.

ARMY IMPACT/PAYOFF:

The War College instruction and simulation technology made possible by this research will speed the development of the leadership and decision skills of mid-career Army leaders, and enhance their ability to operate in a distributed decision environment across the spectrum of conflict.

PROPONENT(S)/SPONSOR(S): ODCSOPS (USAWC)

6.3A PRIORITY: 30 OF 30

FUNDING:	FY92	FY93	**END DATE:** FY92
6.3A	193	0	

PERFORMING ELEMENT:

EXECUTIVE DEVELOPMENT RESEARCH GROUP
MANPOWER AND PERSONNEL RESEARCH LABORATORY

ATBMP SCIENTIFIC AND TECHNICAL OBJECTIVE: V-B-9 LEADERSHIP AND COMMAND STAFF TRAINING

PROGRESS:

Research Report, General Officers (GEN, LTG) Interview Data Base	FY86
DA PAM 600-80, Executive Leadership	FY87
General Officer (MG, BG) Interview Data Base	FY89
Research Report: Executive leadership in a changing world order: Requisite cognitive skills	FY91
Technical Report: Executive leadership: Requisite skills and developmental processes for three- and four-star assignments	FY91
Research Note: Executive development through asynchronous computer conferencing	FY91

FY92/93 MILESTONES:

Specification: Simulation technology to enhance warfighting thinking/decision skill development	FY92

PROJECTED PRODUCTS:

Recommended simulation-based training at Army War College to enhance warfighting thinking/decision skill development	FY92

REQUIREMENT/MEMORANDUM OF AGREEMENT:

Command: ODCSOPS (USAWC)
Title: Program of Research in Support of the U.S. Army War College
Eff. Date: 23 Mar 88

Advanced Development

PROGRAM AREA 3: Training for Combat Effectiveness

3104: ADVANCED TECHNOLOGY FOR THE DESIGN OF TRAINING DEVICES AND SIMULATORS

3205: EFFECTIVE TANK GUNNERY TRAINING STRATEGIES

3207: STRATEGIES FOR TRAINING WITH COMBINED ARMS SIMULATORS

3303: TECHNOLOGIES FOR TRAINING OPERATORS AND MAINTAINERS OF ADVANCED COMMUNICATIONS SYSTEMS

3308: APPLICATION OF TECHNOLOGY TO MEET RESERVE COMPONENT TRAINING NEEDS

3310: APPLICATIONS OF ADVANCED TRAINING TECHNOLOGIES TO LOGISTICS

3402: UNIT PERFORMANCE MEASUREMENT AND FIELD FEEDBACK FROM COMBAT TRAINING CENTERS (CTC)

3403: IMPACT OF COMBAT TRAINING CENTERS (CTC)/HOME STATION ON ARMY READINESS

3404: LIGHT (INFANTRY) FORCES TRAINING AND PERFORMANCE MEASUREMENT

3406: DETERMINANTS OF SMALL UNIT PERFORMANCE

3410: TOTAL AVIATION TRAINING SYSTEM FOR IMPROVING COMBAT READINESS

3413: TRAINING STRATEGIES FOR THE BATTALION TASK FORCE

3104: ADVANCED TECHNOLOGY FOR THE DESIGN OF TRAINING DEVICES AND SIMULATORS

ARMY NEED:

Many trainers and the designers of training devices and simulators feel that these devices must resemble equipment/weapons system and that simulations must replicate in detail the environment simulated. However, while such expensive features may add to realism, they may not contribute to training the skills required to perform critical tasks. Essential instructional features, on the other hand, may be excluded. Procedures for distinguishing among device characteristics that are essential or only seem to be essential and associated cost trade-offs have only begun to be established. Design principles and methods are needed to aid device engineers in developing cost-effective training devices.

APPLICATION/PRODUCT OBJECTIVE:

To develop decision support systems (DSS) for identifying critical task training features and for trading off design features, costs, and estimating training effectiveness of training devices and simulators.

ARMY IMPACT/PAYOFF:

The development and use of decision-support systems will enable engineers to conduct cost-effectiveness analyses of alternative device designs. This includes: (a) estimating the cost of minimally sufficient device features for achieving given training objectives; and (b) estimating the training benefits to be achieved from additional investments in device features that promote learning. Expected results are decreased costs and increased effectiveness of Army training devices.

PROPONENT(S)/SPONSOR(S): AMC (PM TRADE)

6.3A PRIORITY: 22 OF 30

FUNDING:	FY92	FY93	**END DATE:** FY93
6.3A	252	263	

PERFORMING ELEMENT:

PM TRADE FIELD UNIT
TRAINING RESEARCH LABORATORY

ATBMP SCIENTIFIC AND TECHNICAL OBJECTIVE: V-B-5 SIMULATION FIDELITY

PROGRESS:

Completed prototype software and user documentation for initial Optimization of Simulation-Based Training Systems (OSBATS)	FY89
Completed analysis of PM TRADE engineering functions	FY90
Completed review of effects of simulator motion	FY91
Updated model for design of cost-effective training devices based on analysis of engineering functions and validation results	FY91

FY92/93 MILESTONES:

Conduct research on device-based scoring algorithms	FY92
Prepare user and other documentation for updated OSBATS model	FY92

PROJECTED PRODUCTS:

Procedures for setting device-based training standards and for sequencing device-based instruction	FY92
Engineering decision aids for distinguishing between sufficient and superfluous device features	FY93

REQUIREMENT/MEMORANDUM OF AGREEMENT: Pending

3205: EFFECTIVE TANK GUNNERY TRAINING STRATEGIES

ARMY NEED:

Increasing costs of unit training in the field, e.g., ammunition and OPTEMPO, as well as environmental limitations and greatly expanded weapons systems capabilities require greater dependence on simulators and training devices to provide gunnery and maneuver training for train-as-you-will-fight readiness. Improved training strategies must be developed to integrate simulation and field training into the most cost-effective mix. However, empirical data are not presently available to provide the basis for designing optimal training programs. Information is needed to determine required training resources and how to optimally allocate them to individual and collective gunnery training programs.

APPLICATION/PRODUCT OBJECTIVE:

To design, develop, and empirically evaluate alternative tank gunnery training/testing methods and strategies.

ARMY IMPACT/PAYOFF:

This research will provide the means for designing training programs using an optimal mix of simulator and field practice to attain combat readiness. Additionally, it will provide the empirical data necessary for quantifying justifications for necessary training resources and result in significant savings.

PROPONENT(S)/SPONSOR(S): TRADOC (TDAD)

6.3A PRIORITY: 23 OF 30

FUNDING:	FY92	FY93	**END DATE:** FY94
6.3A	371	656	

PERFORMING ELEMENT:

FORT KNOX FIELD UNIT
TRAINING RESEARCH LABORATORY

ATBMP SCIENTIFIC AND TECHNICAL OBJECTIVE: V-B-7 UNIT TRAINING STRATEGIES

PROGRESS:

Validated prototype rapid train-up packages for tank crewman	FY91

FY92/93 MILESTONES:

Initial strategy for cost-effective use of devices and simulators for gunnery training	FY92
Prototype tank gunnery training strategies with simulation, live-fire, and individual part-task training	FY92
Quantification of different mixes of devices and live-fire for gunnery training	FY93

PROJECTED PRODUCTS:

Validated cost-effective tank gunnery and maneuver training strategies	FY94

REQUIREMENT/MEMORANDUM OF AGREEMENT: Pending

3207: STRATEGIES FOR TRAINING WITH COMBINED ARMS SIMULATORS

ARMY NEED:

As traditional training resources dwindle, tactical training will increasingly be accomplished through combined arms simulation. Methods for conducting/managing training and measuring unit performance need to be implemented to make effective use of new collective training technologies within the framework of the Standard Army Training System (SATS) and Combined Arms Training Strategies (CATS), to be developed by TRADOC. Trainers and training managers need guidance on how to develop and implement adaptive collective training based on units' needs and the capabilities of available training resources. Performance measurement tools such as the prototype Unit Performance Assessment System (UPAS) need to be applied and tailored to provide a basis for developing such guidance and integrating it into SATS or follow-on training management systems.

APPLICATION/PRODUCT OBJECTIVE:

To develop prototype training methods, performance measurement tools, and training strategies for integrating combined arms simulators into unit training, focusing on the Close Combat Tactical Trainer (CCTT).

ARMY IMPACT/PAYOFF:

This research will provide guidance to trainers and training managers for making most effective use of the CCTT and other simulations becoming available through the 1990s. Units will be able to maintain required levels of combined arms proficiency even though field training resources become further constrained.

PROPONENT(S)/SPONSOR(S): TRADOC (USAARMC)

6.3A PRIORITY: TBD

FUNDING:	FY92	FY93	**END DATE:** FY96
6.3A	0	589	

PERFORMING ELEMENT:

FORT KNOX FIELD UNIT
TRAINING RESEARCH LABORATORY

ATBMP SCIENTIFIC AND TECHNICAL OBJECTIVE: V-B-7 UNIT TRAINING STRATEGIES

PROGRESS: New Start

FY92/93 MILESTONES:

Apply prototype unit performance measurement system to the CCTT	FY93

PROJECTED PRODUCTS:

Unit training strategies for integrating combined arms simulators with other available training resources	FY95
Performance-based collective training decision aids enabling managers to mix training resources effectively	FY96

REQUIREMENT/MEMORANDUM OF AGREEMENT: Pending

3303: TECHNOLOGIES FOR TRAINING OPERATORS AND MAINTAINERS OF ADVANCED COMMUNICATIONS SYSTEMS

ARMY NEED:

The large amount of training potentially required to meet the needs of the operators and maintainers of the Army's high technology communications and electronics equipment points to the need for more efficient training methods and technologies. The Army's Long Range Training Plan (DCSOPS and TRADOC) indicates a requirement to "exploit the use of technology in all training activities and systems" and "increase reliance upon simulation, simulators, and training devices to develop proficiency."

APPLICATION/PRODUCT OBJECTIVE:

To evaluate the application of emerging technologies (intelligent tutoring and decision aiding systems) in the training of Mobile Subscriber Equipment system operation and troubleshooting skills.

ARMY IMPACT/PAYOFF:

As over 30,000 soldiers are trained each year at the Signal School, new training technologies can produce significant cost savings, as well as improvements in soldier combat effectiveness. The application of advanced training technologies can reduce course length by up to 30% without changing the quality of the output.

PROPONENT(S)/SPONSOR(S): TRADOC (USASC&FG)

6.3A PRIORITY: 25 OF 30

FUNDING:	FY92	FY93	**END DATE:** FY93
6.3A	378	375	

PERFORMING ELEMENT:

FORT GORDON FIELD UNIT
TRAINING RESEARCH LABORATORY

PROGRESS:

Design and evaluation of a Mobile Subscriber Equipment Radio-Telephone Terminal (MSRT) Job Aid	FY90
Prototype High Transfer Training (HITT) methodology developed	FY90
Evaluation of the MSE intelligent tutoring system (ITS) for Large Node Operators	FY91
Validated High Transfer Training (HITT) methodology	FY91
Prototype Intelligent Decision Aid (IDA) for establishing communications support for C^3 operations for the MSE Network Manager	FY91

FY92/93 MILESTONES:

Application of HITT to develop Radio Operator (31M) Course initiated as demonstration of HITT's generality	FY92
Prototype ITS for C^3 operations for the MSE Network Manager	FY92
HITT training effectiveness data collection completed	FY93

PROJECTED PRODUCTS:

Evaluation of HITT methodology training effectiveness	FY93
Evaluation of IDA and ITS effectiveness	FY93

REQUIREMENT/MEMORANDUM OF AGREEMENT: Pending

3308: APPLICATION OF TECHNOLOGY TO MEET RESERVE COMPONENT TRAINING NEEDS

ARMY NEED:

In the Reserve Component (RC), trainers/training managers must meet unique challenges stemming from the geographical dispersion of units and the scarcity of training resources (e.g., time, mission-oriented equipment, training devices/aids, and access to live-fire/maneuver areas). Consequently, there is need to develop (a) device-based, low operational tempo (OPTEMPO)/live-fire training strategies designed for ease of use at the unit level, and (b) cost-effective strategies for remotely delivering training to soldiers at distributed locations.

APPLICATION/PRODUCT OBJECTIVE:

To improve the effectiveness, efficiency, and accessibility of RC training through development/assessment of candidate device-based and distributed training strategies.

ARMY IMPACT/PAYOFF:

RC use of technology-based training strategies will improve performance, reduce costs, and increase training accessibility by allowing soldiers to train at home station (i.e., armory; reserve center).

PROPONENT(S)/SPONSOR(S): DA (IDARNG, NGB, OCAR); TRADOC (TDAD); FORSCOM (RCTR)

6.3A PRIORITY: 7 OF 30

FUNDING:	FY92	FY93	**END DATE:** FY93
6.3A	248	255	

PERFORMING ELEMENT:

BOISE ELEMENT (FORT KNOX FIELD UNIT)
TRAINING RESEARCH LABORATORY

ATBMP SCIENTIFIC AND TECHNICAL OBJECTIVE: V-B-8 COGNITIVE AND COLLECTIVE SKILL RETENTION

PROGRESS:

Completed review of technologies for distributed training	FY88
Completed analysis of RC training needs based on Idaho and nationwide surveys	FY89
Completed review of specific training procedures found to enhance learning, retention, and transfer	FY89
Completed TopGun to M-COFT transfer of training evaluation for M1 tank gunnery skills	FY90
Completed course conversion and instructor training guides for RC training and education via Asynchronous Computer Conferencing (ACC)	FY90
Cost-effectiveness analysis of Asynchronous Computer Conferencing (ACC) for RC home study	FY91
Prototype Reserve Component Armor junior leader computer-based courseware	FY91
Evaluation of Squad Engagement Training System (SETS) for squad-level tactics	FY91

FY92/93 MILESTONES:

Complete data collection for assessment of device-based training time requirements	FY92
Complete data collection on transfer of training from GUARDFIST to COFT	FY92
Complete plan for assessing prototype RC device-based training strategy for CS-CSS MOS	FY93

PROJECTED PRODUCTS:

Prototype RC device-based armor training strategy	FY92

Documentation of RC tank gunnery device-based training time requirements FY93

REQUIREMENT/MEMORANDUM OF AGREEMENT:

Command:	DA (IDARNG, NGB, OCAR); TRADOC (TDAD); FORSCOM (RCTR)
Title:	Establishment of a Training Technology Field Activity, Boise, Idaho
Eff. Date:	12 Jun 85

3310: APPLICATIONS OF ADVANCED TRAINING TECHNOLOGIES TO LOGISTICS

ARMY NEED:

Reports by GAO and 25 years of extensively documented research by Army agencies including ARI have pointed to chronic problems in logistics, i.e. maintenance and supply. These studies have shown that skill deficiency is a major cause of the problems. The Army needs to find more effective ways to train its maintainers and suppliers. TRADOC has concluded that automation of training development and management is critical to their improvement, because qualified developers are in short supply and development methods are inefficient. Research to support automation is available and emerging. However, there is a continuous need to ensure emerging technologies achieve their potential by demonstrations in operational settings.

APPLICATION/PRODUCT OBJECTIVE:

To demonstrate how prototype training development/management techniques and tools can be applied to logistics, and generalized to other TRADOC operational settings by incorporating these prototypes into the Army's Automated Systems Approach to Training (ASAT).

ARMY IMPACT/PAYOFF:

Successful demonstrations will increase acceptance and use of training technology, and thereby increase the speed and improve the quality of development, production, and delivery of training with a smaller and less experienced work force.

PROPONENT(S)/SPONSOR(S): TRADOC (LOGCEN)

6.3A PRIORITY: 29 OF 30

FUNDING:	FY92	FY93	**END DATE:** FY94
6.3A	309	341	

PERFORMING ELEMENT:

AUTOMATED INSTRUCTIONAL SYSTEMS TECHNICAL AREA
TRAINING RESEARCH LABORATORY

PROGRESS:

Analysis of TRADOC Pams and Regs defining policy and procedures for performance evaluation	FY91
Identification and initial review of candidate technologies to aid in evaluating logistics training effectiveness	FY91
Selection of operational testbed to conduct field R&D	FY91

FY92/93 MILESTONES:

Field test of performance evaluation tools	FY92
Identification of candidate technologies to aid in the design of logistics training using ASAT	FY92
Field test of training design tools	FY93
Identification of candidate technologies to aid in the analysis of logistics training requirements	FY93

PROJECTED PRODUCTS:

Demonstrated performance evaluation technologies for ASAT	FY92
Demonstrated training design technologies for ASAT	FY93
Demonstrated training requirements analysis technologies for ASAT	FY94

REQUIREMENT/MEMORANDUM OF AGREEMENT: Pending

3402: UNIT PERFORMANCE MEASUREMENT AND FIELD FEEDBACK FROM COMBAT TRAINING CENTERS (CTC)

ARMY NEED:

Feedback to units on their performance at the CTC to correct training deficiencies, and development of Army Lessons Learned in tactical doctrine requires comprehensive, objective and reliable measures of unit performance for: missions, tasks and the battlefield operating systems. The need for feedback from unit performance to TRADOC service schools and centers is asserted by TRADOC's Mission Area Analysis, and other key requirements documents. Army Training 1990 states that, "External evaluation must be strengthened to ensure that objective, specific field feedback is aggressively obtained, analyzed and used to substantiate decisions or cause change to training. Evaluation must drive the training and training development system."

APPLICATION/PRODUCT OBJECTIVE:

To develop methods for objectively and accurately measuring unit performance at the CTCs; to develop the methodology required to provide the system with feedback for improving Army training, doctrine, and combat readiness.

ARMY IMPACT/PAYOFF:

Increased level of combat readiness made possible by improvements in: tactical doctrine, training support, training program design, and training management procedures resulting from more objective and reliable measurement of unit performance and lessons learned.

PROPONENT(S)/SPONSOR(S): TRADOC (CAC-T)

6.3A PRIORITY: 4 OF 30

FUNDING:	FY92	FY93	**END DATE:** FY93
6.3A	606	361	

PERFORMING ELEMENT:

PRESIDIO OF MONTEREY FIELD UNIT
TRAINING RESEARCH LABORATORY

ATBMP SCIENTIFIC AND TECHNICAL OBJECTIVE: V-B-7 UNIT TRAINING STRATEGIES

PROGRESS:

Completed archive catalog and designed automated catalog system to facilitate user access	FY89
Developed ARI-CTC Archive and Research Center Workshop and documentation	FY89
Developed PC-based tools for dynamic replay of CTC missions	FY89
Completed initial research on measures of performance for Intelligence and Combat Service Support Operating Systems	FY90
Completed development of Combat Operations Research Facility (CORF) for efficient extraction of lessons learned from CTC data archive	FY91
Designed database structures for battlefield graphics, Take Home Package (THP), and Mission Training Plan (MTP) information	FY91
Developed prototype format for THP	FY91

FY92/93 MILESTONES:

Modify ARI-CTC Archive and Research Center Workshop to incorporate CORF capabilities	FY92
Obtain user feedback and utilization experience concerning needed improvements in CTC archive data analysis	FY92

PROJECTED PRODUCTS:

Workbooks and catalogs for revised ARI-CTC Archive and Research Center Workshop	FY92
Feedback systems for CTC operation and data utilization	FY93
Measurement system for tactical unit combat performance	FY93

REQUIREMENT/MEMORANDUM OF AGREEMENT:

Command:	TRADOC (CAC-T)
Title:	Combat Training Centers (CTC) and Unit Home Station Training and Lessons Learned System
Eff. Date:	02 May 88

3403: IMPACT OF COMBAT TRAINING CENTERS (CTC)/HOME STATION ON ARMY READINESS

ARMY NEED:

The need for improving Army training, training management, leadership practices, and unit cohesion to insure combat readiness continues to be emphasized at the highest levels within the Army. Increasing constraints on resources will exacerbate the difficulties in achieving improvement. There is a need to determine how home station conditions and practices contribute to unit combat readiness, as measured by performance at both home station and the CTC.

APPLICATION/PRODUCT OBJECTIVE:

To identify and measure practices/procedures at home station which contribute to or predict effective unit performance as measured at the National Training Center (NTC); to develop and evaluate innovations at home station which can improve unit training readiness.

ARMY IMPACT/PAYOFF:

Unit training under the demanding conditions present at the CTC results in improved combat readiness of units undergoing that training. The linkage of unit and home station factors to performance of the units at the CTC will result in improved information for resourcing, doctrine, training, and policy, and contribute to improving readiness Army-wide.

PROPONENT(S)/SPONSOR(S): TRADOC (CAC-T)

6.3A PRIORITY: 3 OF 30

FUNDING:	FY92	FY93	**END DATE:** FY92
6.3A	135	0	

PERFORMING ELEMENT:

PRESIDIO OF MONTEREY FIELD UNIT
TRAINING RESEARCH LABORATORY

ATBMP SCIENTIFIC AND TECHNICAL OBJECTIVE: V-B-7 UNIT TRAINING STRATEGIES

PROGRESS:

Home station data collection initiated at three divisions	FY88
Research completed objectively linking ground operational tempo (OPTEMPO) to unit combat proficiency at the National Training Center (NTC)	FY89
Completion of data collection on FORSCOM brigades rotating to the NTC	FY90
Relationship of leadership characteristics to unit performance at the NTC	FY91
Relationship of training resource utilization to NTC performance	FY91

FY92/93 MILESTONES:

Relationship of turnover and turbulence to training effectiveness and NTC performance	FY92
Home station innovations/interventions identified based on findings of important factors producing high performance at NTC	FY92

PROJECTED PRODUCTS:

Summary of major findings on home station determinants of effective performance at the NTC	FY92
Recommended home station innovations/interventions	FY92

REQUIREMENT/MEMORANDUM OF AGREEMENT:

Command: TRADOC (CAC-T)
Title: Combat Training Centers (CTC) and Unit Home Station Training and Lessons Learned System
Eff. Date: 02 May 88

3404: LIGHT (INFANTRY) FORCES TRAINING AND PERFORMANCE MEASUREMENT

ARMY NEED:

Light (Infantry) Forces must train to support unconventional warfare scenarios, perform operations of limited duration in support of host nation forces, and fight as a pivotal part of combined arms operations in developed regions of the world. Training for all these diverse missions must be effective and efficient as training resources diminish. There is a need to identify the training practices/procedures that will maximize Light Forces combat readiness.

APPLICATION/PRODUCT OBJECTIVE:

To relate training practices/procedures of Light (Infantry) Force units to effective performance at the Joint Readiness Training Center (JRTC); to identify unit training problems demonstrated by performance at the JRTC and to develop and evaluate potential solutions.

ARMY IMPACT/PAYOFF:

This research will provide the Army with an accurate assessment of the impact of home station training practices on Light Forces mission performance. Applying the findings of this research will result in improved training and combat readiness of Light Forces to perform effectively in future conflicts.

PROPONENT(S)/SPONSOR(S): TRADOC (CAC-T)

6.3A PRIORITY: 12 OF 30

FUNDING:	FY92	FY93	**END DATE:** FY94
6.3A	587	822	

PERFORMING ELEMENT:

FORT BENNING FIELD UNIT
TRAINING RESEARCH LABORATORY

ATBMP SCIENTIFIC AND TECHNICAL OBJECTIVE: V-B-7 UNIT TRAINING STRATEGIES

PROGRESS:

Analyses of Light Infantry doctrine and training	FY90
Data collection on Light Forces home station predictors of JRTC performance	FY90
Identified Light Forces unit combat readiness predictors as measured by JRTC performance	FY90
Identification of staff integration as major performance problems at JRTC	FY91
Development of initial home station training interventions to improve Light Infantry unit performance	FY91

FY92/93 MILESTONES:

Complete research on Light Forces home station training determinants	FY92
Develop recommended solutions and interventions to Light Forces training issues	FY93

PROJECTED PRODUCTS:

Home station determinants of effective performance at the JRTC	FY92
Recommended training strategies for institutions and units to improve command and staff synchronization	FY94

REQUIREMENT/MEMORANDUM OF AGREEMENT:

Command: TRADOC (CAC-T)
Title: Combat Training Centers (CTC) and Unit Home Station Training and Lessons Learned System
Eff. Date: [illegible] May 88

3406: DETERMINANTS OF SMALL UNIT PERFORMANCE

ARMY NEED:

Army doctrine states that leadership, unit cohesion and soldier motivation are primary factors that contribute to unit combat power and effectiveness. Further, the recently completed Leader Development Study by TRADOC indicates that leadership can be improved through better specification, validation, and measurement of the leadership behaviors critical to soldier and unit effectiveness. In the future, Army units may need to fight as small, autonomous entities. This will require technically and tactically competent leaders who can understand and manage unit dynamics to foster cohesion, commitment, and motivation.

APPLICATION/PRODUCT OBJECTIVE:

To explain the relationships of home station leadership, cohesion, and motivation to unit performance at the Combat Training Centers (CTC); to develop interventions that improve the Army's capability to develop and maintain leadership, motivation, cohesion and communication in small combat units.

ARMY IMPACT/PAYOFF:

This research will increase the Army's capability to train its leaders and units to prepare for and win in combat through improved home station policies, programs and procedures.

PROPONENT(S)/SPONSOR(S): TRADOC (CGSC, CAC-T)

6.3A PRIORITY: 20 OF 30

FUNDING:	FY92	FY93	**END DATE:** FY93
6.3A	689	695	

PERFORMING ELEMENT:

LEADERSHIP AND MOTIVATION TECHNICAL AREA
TRAINING RESEARCH LABORATORY

ATBMP SCIENTIFIC AND TECHNICAL OBJECTIVE: V-B-9 LEADERSHIP AND COMMAND STAFF TRAINING

PROGRESS:

Measures of platoon cohesion linked to platoon and leader performance	FY88
Analysis of survey data to identify categories of leader performances/tasks	FY89
Measurement of leadership and unit performance at the National Training Center (NTC)	FY89
Completion of data collection on homestation leadership, cohesion and motivation	FY90
Derivation of dimensions of Army leadership	FY90
Relationships between unit performance at the JRTC and home station leadership, motivation and personnel turbulence	FY91

FY92/93 MILESTONES:

Develop unit motivation and cohesion assessment instruments, procedures and programs for small unit leaders	FY92
Develop prototype materiels for leadership doctrine and training	FY92
Validate assessment measures, procedures, and techniques for unit leaders to build and sustain unit cohesion and motivation	FY93

PROJECTED PRODUCTS:

Leadership, cohesion, and motivation as home station determinants of unit performance at the JRTC	FY92
Recommended materials for improved leadership training and doctrine	FY92
Recommended measures, procedures, and techniques for improving small unit cohesion and motivation	FY93

REQUIREMENT/MEMORANDUM OF AGREEMENT:

Command:	TRADOC (CGSC)
Title:	Program of Research in Support of the Center for Army Leadership
Eff. Date:	15 Nov 90

Command:	TRADOC (CAC-T)
Title:	Combat Training Centers (CTC) and Unit Home Station Training and Lessons Learned System
Eff. Date:	02 May 88

3410: TOTAL AVIATION TRAINING SYSTEM FOR IMPROVING COMBAT READINESS

ARMY NEED:

Reduced training resources require the implementation of low cost, low complexity training devices that will ensure the combat readiness of Army aviators and associated personnel. The use of simulators will help to ensure such readiness. However, simulator resources are also at a premium and would be cost prohibitive for skill acquisition and retention when less complex and costly training devices and programs may be used. Research is needed to determine the effects of low complexity devices on the combat readiness of aviation personnel and the optimum utilization of such devices as part of cost-effective training strategies for all levels of the Army aviation community.

APPLICATION/PRODUCT OBJECTIVE:

To define how the capabilities of low complexity and low cost training devices can improve the combat readiness of aviators, aircrews and support personnel; to determine the most cost-effective mixes of devices, aircraft and simulators for future aviation training strategies.

ARMY IMPACT/PAYOFF:

Defining the effects of low cost, low complexity training devices on combat readiness will allow aviation units to maintain a high state of readiness without large expenditures of scarce resources. Determining how low complexity devices can supplement use of highly complex simulators and aircraft will form optimal aviation training strategies reducing training time and costs.

PROPONENT(S)/SPONSOR(S): TRADOC (USAAVNC)

6.3A PRIORITY: 10 OF 30

FUNDING:	FY92	FY93	**END DATE:** FY94
6.3A	296	304	

PERFORMING ELEMENT:

FORT RUCKER (AVIATION RESEARCH AND DEVELOPMENT ACTIVITY)
TRAINING RESEARCH LABORATORY

PROGRESS: New Start

FY92/93 MILESTONES:

Define Aviator Total Training System (ATTS) as framework for aviation training strategy	FY92
Evaluate and define tasks that can be best trained by low cost, low complexity devices	FY92
Evaluate effects of training using existing low-complexity devices on combat readiness	FY93

PROJECTED PRODUCTS:

Validated aviation training strategy using mix of simulators, low complexity devices, part-task trainers, and other instructional resources	FY94

REQUIREMENT/MEMORANDUM OF AGREEMENT: Pending

3413: TRAINING STRATEGIES FOR THE BATTALION TASK FORCE

ARMY NEED:

Key points of AirLand Battle-Future (ALBF) doctrine are: (a) contingency operations growing in importance, (b) always joint operations, often combined, (c) the brigade is responsible for integrating Combat, Combat Support, and Combat Service Support activities, (d) logistics centralized in the Forward Support Battalion, and (e) command and control agility and synchronization are increasingly important. The Combined Arms Training Strategy (CATS) is intended to provide the structure and guidance to train the total Army to operate effectively as a combined arms force. It will also serve as the driver for training resource procurement, development, and management. Training strategies need to be developed to permit meeting both the ALBF and CATS requirements. Research is needed to assist in the development of more efficient/effective combined arms training.

APPLICATION/PRODUCT OBJECTIVE:

To develop a methodology for unit training managers to use to design, resource, and schedule Battalion Task Force training programs, as mission requirements change.

ARMY IMPACT/PAYOFF:

Improved Battalion Task Force training program management will achieve and maintain combat readiness with minimum resources (e.g., OPTEMPO).

PROPONENT(S)/SPONSOR(S): TRADOC (CAC-T)

6.3A PRIORITY: 18 OF 30

FUNDING:	**FY92**	**FY93**	**END DATE:** FY94
6.3A	339	682	

PERFORMING ELEMENT:

PRESIDIO OF MONTEREY FIELD UNIT
TRAINING RESEARCH LABORATORY

PROGRESS: New Start

FY92/93 MILESTONES:

Develop methodology to design and create prototype Battalion Task Force training programs	FY92
Evaluation of methodology/prototype programs	FY93

PROJECTED TECHNOLOGY PRODUCTS:

Methodology for unit training managers to design, resource and schedule Battalion Task Force training	FY94

REQUIREMENT/MEMORANDUM OF AGREEMENT: Pending

APPENDICES

APPENDIX A

ARMY TECHNOLOGY BASE MASTER PLAN (ATBMP) SCIENCE AND TECHNOLOGY OBJECTIVES (STO)

SCIENCE AND TECHNOLOGY OBJECTIVES (STO)
(June 1991)

Army Technology Base Master Plan

Chapter V
RESOLUTION OF SYSTEMIC PROBLEMS

Soldier-Oriented R&D in Personnel Performance & Training (SORD-PT)

STO V-B-1

SOLDIER ASSIGNMENT. Develop improved methods by FY93 for selecting and assigning quality soldiers to each job to increase combat effectiveness, reducing attrition by 15% and improving performance by 10%. Develop by FY94 improved selection procedures for Special Operations/Low Intensity Conflict (SO/LIC) forces, reducing attrition by 25%.

POC: Dr. Zita Simutis, ARI TSO: R. Klemmer

Funding: 63007/A792

Supporting Tasks

2207: Selection and Classification Tests for Critical MOS
2208: Building the Career Force
2209: Specialized MOS Classification and Army-Wide Selection Methods
2214: Special Forces Career Enhancement

STO V-B-2

RECRUITING AND RETENTION OF QUALITY SOLDIERS. By FY92, determine family-oriented policies and programs that will help ensure retention of quality soldiers, signi-ficantly increasing the cost-effectiveness of these policies/ programs. By FY94, demonstrate prototype model to quantify the beneficial effects of Army experience for the individual and society. By FY94, demonstrate a recruiting incentives management model to ensure quality accessions, reducing accession costs by 5%.

POC: Dr. Zita Simutis, ARI TSO: R. Klemmer

Funding: 63007/A792

Supporting Tasks

2104: Enhancing Recruiting Performance
2302: Family-Based Soldier Retention and Readiness

STO V-B-3

MANPRINT ASSESSMENT TECHNIQUES. Develop by FY92 methods for assessing the impact of soldier-oriented HMPT variables on system operability, maintainability, force design and force structure. Demonstrate by FY93 improved hardware-manpower (HARDMAN) III methods for comprehensive estimation of human factors, manpower, personnel and training (HMPT) requirements early in combat development and system design, providing five times as much information in 3-4 weeks rather than 75-100 weeks. By FY94, develop methods to empirically determine MOS restructuring options in terms of manpower, personnel, and training impacts.

POC: Dr. Robin Keesee, ARI TSO: R. Klemmer

Funding: 63007/A793

Supporting Tasks

1203: Soldier Errors in Fire Support and Other Automated Weapon Systems
1204: Performance-Based Manpower, Personnel and Training Estimation

STO V-B-4

SOLDIER-SYSTEM PERFORMANCE ENHANCEMENT. By FY93, develop analytic tools to identify soldier skill, knowledge, and ability requirements for new intelligence and electronic warfare (IEW) system design and training, reducing soldier-induced errors by a third. By FY94, demonstrate, through man-in-the-loop and crew-in-the-loop simulations, decision aids and procedures for crew-served and C3I systems to "help shift the load from the head to the hardware".

POC: Dr. Robin Keesee, ARI TSO: R. Klemmer

Funding: 63007/A793

Supporting Tasks

1304: Enhanced Command Staff Performance in Combat Operations
1307: Evaluating Command Post Performance
1309: Prognostic Models of Military Intelligence (MI) Soldier Information Processing Performance

STO V-B-5

SIMULATION FIDELITY. Demonstrate by FY92 models that will trade off realism and cost for design of effective simulators/training devices at the lowest possible cost. Through joint Canadian/U.S Army/USAF effort, determine by FY93 the least expensive fidelity requirements for the first of a family of future aviation simulators.

POC: Dr. Jack Hiller, ARI TSO: R. Klemmer

Funding: 62785/A790 and 63007/A63007

Supporting Tasks

3104: Advanced Technology for the Design of Training Devices and Simulators
3201: Low Complexity Simulation Training for Aviation Unit Tactical Superiority (6.2)
3221: Simulation Fidelity Requirements for Cost-Effective Aviation Training

STO V-B-6

ARTIFICIAL INTELLIGENCE (AI) FOR TRAINING. By FY94, demonstrate portable AI-based language training techniques. By FY95, demonstrate an AI-based "automated authoring" system for training materials, decreasing training development support costs by at least a third.

POC: Dr. Jack Hiller TSO: R. Klemmer

Funding: 62785/A791

Supporting Task

3210: Advanced Language Learning Technology (6.2)

STO V-B-7

UNIT TRAINING STRATEGIES. To improve unit training efficiency by 30%: By FY92, develop cost-effective tank gunnery training strategies (mix of "live fire", individual training devices and team simulators) By FY93, determine the relationship between effective unit performance at the Combat Training Centers (CTCs) and home station training. Design by FY95 unit training strategies for the most cost effective mix of home station training, networked simulators (such as SIMNET and AIRNET), and CTC training, reducing TDY and range costs by 50% and costs of using actual equipment

by a factor of 10. Demonstrate by FY97 an expert system for assessing unit tactical performance at CTCs, increasing the precision for measuring unit combat readiness.

POC: Dr. Jack Hiller, ARI TSO: R. Klemmer

Funding: 63007/A794

Supporting Tasks

3205: Effective Tank Gunnery Training Strategies
3207: Strategies for Training with Combined Arms Simulators
3402: Unit Performance Measurement and Field Feedback From Combat Training Centers
3403: Impact Of Combat Training Centers (CTC)/Home Station on Army Readiness
3404: Light (Infantry) Forces Training and Performance Measurement
3415: Visualization of the Battlefield (6.2)

STO V-B-8

COGNITIVE AND COLLECTIVE SKILL RETENTION. To increase combat training effectiveness by at least 10 %: Demonstrate training strategies for cognitive (problem solving) skill acquisition and retention for various critical tasks by FY93. Demonstrate by FY93 training techniques/strategies to enhance Reserve Component (RC) unit readiness with limited training time. By FY94, demonstrate collective skill retention strategies for estimating needed retraining for combat unit tasks.

POC: Dr. Jack Hiller, and TSO: R. Klemmer

Funding: 62785/A791 and 63007/A794

Supporting Tasks

3302: Acquistion and Retention of Cognitive Skills (6.2)
3308: Application of Technology to Meet Reserve Component Training Needs
3401: Collective Skill Development and Sustainment (6.2)

STO V-B-9

LEADERSHIP AND COMMAND STAFF TRAINING. By FY92, empirically determine the relationship of leadership, cohesion and motivation to unit tactical performance. Develop training strategies by FY92 for improving senior (GO level) decision

making/war fighting skills. By FY95, demonstrate prototype method to improve command group readiness training that requires 40-60% fewer support personnel.

POC: Dr. Jack Hiller TSO: R. Klemmer

Funding: 62785/791 and 63007/A792 and A794

Supporting Tasks

1303: Enhanced Techniques for Command Staff Performance (6.2)
2403: Senior Leader Development
3406: Determinants of Small Unit Performance

APPENDIX B

PROPONENTS/SPONSORS

PROPONENTS/SPONSORS

AMC: ARMY MATERIEL COMMAND

AVSCOM:	Aviation Systems Command
PM TRADE:	Project Manager for Training Devices
TACOM:	Tank-Automotive Command

DA: DEPARTMENT OF THE ARMY

IDARNG:	Idaho Army Reserve National Guard
NGB:	National Guard Bureau
OCAR:	Office Chief of Army Reserve
OTEA:	Operational Test and Evaluation Agency
SARDA:	Secretary of the Army Research and Development and Acquisition

FORSCOM: U.S. ARMY FORCES COMMAND

RCTR:	Reserve Center

ODCSOPS: OFFICE, DEPUTY CHIEF OF STAFF FOR MILITARY OPERATIONS

DCSOPS (TR):	Deputy Chief of Staff for Operations, Training Directorate
USAWC:	U.S. Army War College

ODCSPER: OFFICE OF DEPUTY CHIEF OF STAFF FOR PERSONNEL

CIVPERCEN:	Civilian Personnel Center
CP:	Civilian Personnel
DHRD:	Director of Human Resources Development
DMPM:	Director of Military Personnel Management
DMPM (ED):	Director of Military Personnel Management, Education Division
MANPRINT:	Manpower and Personnel Integration
MILPERCEN:	Military Personnel Center
USACFSC:	U.S. Army Community and Family Support Center
USAPIC:	U.S. Army Personnel Integration Command
USAREC:	U.S. Army Recruiting Command

OUSDRE: OFFICE OF UNDER SECRETARY OF DEFENSE FOR RESEARCH AND ENGINEERING

JFAAD:	Joint Forward Area Air Defense

TRADOC: TRAINING AND DOCTRINE COMMAND

ATSC:	Army Training Support Center
CAC:	Combined Arms Center
CAC-CD:	Combined Arms Center - Combat Development
CAC-T:	Combined Arms Center - Training
CGSC:	Command and General Staff College
DCSCD:	Deputy Chief of Staff for Combat Developments
DCSDOC:	Deputy Chief of Staff for Doctrine
DCST:	Deputy Chief of Staff for Training
DLIFLC:	Defense Language Institute, Foreign Language Center
LOGCEN:	Logistics Center
SSC:	Soldier Support Center
SSC-NCR:	Soldier Support Center National Capital
TCATA:	TRADOC Combined Arms Test Activity
TDAD:	Training Development and Analyses Direct
TEXCOM:	Testing and Experimentation Command
TTA:	Training Technology Activity
USAADASCH:	U.S. Army Air Defense Artillery School
USAAEB:	U.S. Army Armor and Engineer Board
USAARMC:	U.S. Army Armor Center
USAAVNC:	U.S. Army Aviation Center
USACEB:	U.S. Army Communications Electronics Board
USAES:	U.S. Army Engineer School
USAFAB:	U.S. Army Field Artillery Board
USAFACFS:	U.S. Army Field Artillery Center and Fort Sill
USAFAS:	U.S. Army Field Artillery School
USAICS:	U.S. Army Intelligence Center and School
USAIS:	U.S. Army Infantry School
USAOC&S:	U.S. Army Ordinance Center and School
USAQMS:	U.S. Army Quartermaster School
USASC:	U.S. Army Safety Center
USASC&FG:	U.S. Army Signal Center and Fort Gordon
USASMA:	U.S. Army Sergeant Major Academy
USASOC:	U.S. Army Special Operations Command
USASWC:	U.S. Army Special Warfare Center
USATB:	U.S. Army Training Board

USAMRDC: U.S. ARMY MEDICAL RESEARCH AND DEVELOPMENT COMMAND

TSG:	The Surgeon General
USAARL:	U.S. Army Aeromedical Research Laboratory

APPENDIX C

ACRONYMS

AND

ABBREVIATIONS

ACRONYMS AND ABBREVIATIONS

A

AAA	Army Audit Agency
AAR	After Action Review
AAWS-M	Advanced Anti-Aircraft Weapons System-Medium
ABLE	Assessment of Background and Life Experiences
AC	Active Component
ACCES	Army Command and Control Evaluation System
ACCS	Army Command and Control System
ACES	Army Continuing Educational System
ACM	Army Compensation Model
ACOL II	Annualized Cost of Leaving II
ACOMS	Army Communication Objective Measurement System
ACSS	Army Career Satisfaction Survey
ADAC	Air Defense Artillery Control
ADATS	Air Defense Anti-Tank System
ADEA	Army Development and Employment Agency
AFAS	Advanced Field Artillery Systems
AFHRL	Air Force Human Research Laboratory
AFQT	Armed Forces Qualification Test
AFV	Armored Family of Vehicles
AH	Attack Helicopter
AHIP	Army Helicopter Improvement Program
AI	Artificial Intelligence
AIMP	Army Intelligence Electronic Warfare Master Plan
AIMS	Army Internal Manpower Supply
AIRNET	Air Net (Aviation Version of SIMNET)
AIT	Advanced Individual Training
AKAT	Automated Knowledge Acquisition Tool
ALB-F	AirLand Battle-Future
AMC	Army Material Command
AMCOS	Army Manpower Cost Modeling System
AMTEP	ARTEP Mission Training Plan
AMTP	Army Training and Evaluation Mission Training Plan
ANCOC	Advanced Non-Commissioned Officer Course
AOAC	Armor Officer Advanced Course
AOBC	Armor Officer Basic Course
AQC	Aviator Qualification Course
ARI	Army Research Institute for the Behavioral and Social Sciences
ARMY 21	Army of 21st Century
ARNG/USAR	Army National Guard/U.S. Army Reserve
ARPM	Army Requirements Projections Model
ARTBASS	Army Training Battle Simulation System
ARTEP	Army Training and Evaluation Program
ASA	Assistant Secretary of the Army
ASA (FM)	Assistant Secretary of the Army for Financial Management
ASA (RDA)	Assistant Secretary of the Army for Research

	Development and Acquisition
ASARC	Army Systems Acquisition Review Council
ASAS	All Sources Analysis System
ASAT	Automated System Approach to Training
ASIS	Army Space Initiative Study
AST	Accident Scenario Training
ASVAB	Armed Services Vocational Aptitude Battery
ATACMS	Army Tactical Missile System
ATB	Army Training Board
ATBMP	Army Technology Base Master Plan
ATCCS	Army Tactical Command and Control System
ATHS	Aerial Target Handover System
ATM	Aircrew Training Manual
ATSC	Army Training Support Center
ATTS	Aviator Total Training System
AVNMAA	Aviation Mission Area Analysis
AVNOAC	Army Aviation Officer Advanced Course
AVNOBC	Army Aviation Officer Basic Course
AVNEC	Army Aviation Employment Conference
AVSCOM	Aviation Systems Command

B

BASOPS	Base Operating Information System
BAT	Basic Armor Training
BCTP	Battle Command Training Program
BDAR	Battlefield Damage Assessment and Repair
BDP	Battlefield Development Plan
BDS-D	Battlefield Distributed Simulation Development
BMS	Battlefield Management System
BN	Battalion
BNCOC	Basic Non-Commissioned Officer Course
BSEP	Basic Skills Education Program
BTM	Battalion Training Model

C

C^2	Command and Control
C^2E	Continuous and Comprehensive Evaluation
C^2PM	Command and Control Performance Measurement
C^3	Command, Control and Communications
C^3I	Command, Control, Communications and Intelligence
CAC	Combined Arms Center
CAC-CD	Combined Arms Center - Combat Development
CAC-T	Combined Arms Center - Training
CAD	Computer Aided Design
CAI	Computer Assisted Instruction
CAL	Center for Army Leadership
CALL	Center for Army Lessons Learned
CAPS	Computer-Based ARTEP Production System

CAS^3	Combined Arms and Services Staff School
CAST	Computer Adaptive Screening Test
CAT	Computer Adaptive Testing
CATS	Combined Arms Training Strategy
CBI	Computer-Based Instruction
CBRS	Concept-Based Requirements System
CCTT	Close Combat Tactical Trainer
CDC	Crew Design Capability
CD-ROM	Compact Disc-Read Only Memory
CEOI	Communications-Electronics Operating Instructions
CGSC	Command and General Staff College
CIG	Computer Image Generator
CITV	Commander's Independent Thermal Viewer
CIVPERCEN	Civilian Personnel Center
COFT	Conduct of Fire Trainer
CONUS	Continental United States
CO/SAM	Console Operator/System Assessment Methodology
CO/TM	Company/Team
CP	Command Post
CPX	Command Post Exercise
CRDS	Crew Requirements Definition System
CSA	Chief of Staff, U.S. Army
CTC	Combat Training Centers
CVC^2	Combat Vehicle Command and Control
CVI	Combat Vehicle Identification

D

DA	Department of the Army
DARPA	Defense Advanced Research Project Agency
DCSINT	Deputy Chief of Staff for Intelligence
DCSPER	Deputy Chief of Staff for Personnel
DCST	Deputy Chief of Staff for Training, TRADOC
DEP	Delayed Entry Program
DHRD	Director, Human Resources Division, DA DCSPER
DID	Data Item Description
DLIFLC	Defense Language Institute, Foreign Language Center
DMPM DCSPER	Director, Military Personnel Management, DA
DMPM/ED	Director, Military Personnel Management/Education
DMPS DCSPER	Director, Manpower Policy and Standards, DA
DOD	Department of Defense
DOTD	Directorate of Training Development
DSS	Decision Support System
DT	Developmental Testing

E

ECS	Equipment Concentration Sites

EIDS	Electronic Information Display System
EIDS/PC	Electronic Information Display System/Personal Computer
EDDIC	Experimental Development and Integration Center
EOAC	Engineer Officer Advanced Course
EPAS	Enlisted Personnel Allocation System
EPRDB	Enlisted Panel Research Data Base
ET	Embedded Training
EUTE	Early User Test and Evaluation
EW	Electronic Warfare

F

FA	Field Artillery
FAAD	Forward Area Air Defense
FAADS	Forward Area Air Defense System
FAST	Flight Aptitude Selection Test
FDTE	Force Development Test and Evaluation
FIST	Fire Support Team
FIST-V	Fire Support Team-Vehicle
FLCS	Force Level Control System
FLIR	Forward-Looking Infrared
FM	Field Manual
FOE	Follow-On Evaluation
FOG-M	Fiber Optic Guided Missile
FORSCOM	U.S. Army Forces Command
FSB	Forward Support Battalion
FTX	Field Training Exercise

G

G^2	Intelligence
G^3	Operations and Plans
GAO	General Accounting Office
GO/SES	General Officer/Senior Executive Service
GT	General Technical

H

HARDMAN	Hardware and Manpower
HELLFIRE	Anti-Tank Missile System
HF	Human Factors
HF&S	Human Factors and Safety
HFMP	Heavy Force Modernization Program
HHC	Headquarters and Headquarters Company
HIMAD	High-to-Medium Altitude Air Defense
HIP	Howitzer Improvement Program
HIPIR	High Power Illuminator Radar
HITT	High Transfer Training
HMMWV	High Mobility Multiple Purpose Wheeled Vehicle
HMPT	Human Factors, Manpower, Personnel and Training

HOOT	Handbook for Operating the OWLKNEST Technology
HOS V	Human Operation Simulator V
HQ	Headquarters
HQDA	Headquarters, Department of the Army
HUD	Heads Up Display
HV	Heavy Variant

I

ICAI	Intelligent Computer Assisted Instruction
ICARUS	Integrated Characteristics Availability Based Redesign Utility System
IDARNG	Idaho Army National Guard
IDEAS	Intelligent Development Environment and Authority System
IDF	Israeli Defense Forces
IDSS	Intelligent Decision Support System
IDT	Inactive Duty Training
IERW	Initial Entry Rotary Wing
IEW	Intelligence and Electronic Warfare
IFCS	Integrated Flight Control System
IFCST	Institutional Fire Control System Trainer
ILS	Integrated Logistics Support
IMINT	Imagery Intelligence
INCOFT	Intelligent Conduct of Fire Trainer
I/O	Input/Output
IP	Incentive Pay
IPR	In-Process Review
IRR	Individual Ready Reserve
ISAT	Intelligent Automated System Approach to Training
IST	Information Systems Technology
ITES	Integrated Test and Evaluation System
ITV	Interim Tow Vehicle
IVIS	Inter-Vehicular Information System
IVD	Interactive Videodisc
IVS	Interactive Videodisc System

J

JDLC^2	Joint Director of Laboratories Command and Control
JESS	Joint Exercise Simulation System
JFAAD	Joint Forward Area Air Defense
JFKSWC	John F. Kennedy Special Warfare Center
JSMACS	Joint Service Multipurpose Arcade Combat Simulator
JPM	Job Performance Measurement
JRTC	Joint Readiness Training Center
JSATS	Joint Services Automated Training System Project
JSEP	Job Skills Education Program
JSEPACT	Job Skills Education Program Academic Competencies Testing Program

JSTARS	Joint Surveillance Target Attack Radar System
JTIDS	Joint Tactical Information Distribution System

K

L

LCOM	Logistics Composite (Model)
LCSMM	Life Cycle System Management Model
LHX	Light Helicopter Experimental
LHX-SCAT	Light Helicopter Experimental-Scout Attack
LIC	Low Intensity Conflict
LISP	List Processing
LOGCEN	Logistics Center
LOS-F-H	Line of Sight-Forward-Heavy
LOS-F(H)-ADATS	Line of Sight-Forward (Heavy)-Air Defense Anti-Tank System
LROC	Longitudinal Research on Officers' Careers
LTACFIRE	Light TACFIRE

M

M-CON	Manpower Constraint
MAA	Mission Area Analysis
MACOM	Major Army Command
MACS	Multipurpose Arcade Combat Simulator
MANCAP II	Manpower Capabilities Analysis II
MANPAD	Man-Portable Air Defense
MANPRINT	Manpower and Personnel Integration
MANSEVAL	Manpower System Evaluation
MAP	Material Acquisition Process
MCS	Maneuver Control System
MCS 2	Manpower Control System 2
MEPCOM	Military Enlistment Processing Command
MEPS	Military Entrance Processing Station
MER	Manpower Estimate Report
METT-T	Mission, Enemy, Troops, Terrain, and Time Available
MH-47E	Helicopter
MI	Military Intelligence
MICPX	Military Intelligence Command Post Exercise
MILPERCEN	Military Personnel Center
MK-1	Mark-1
MLRS	Multiple Launch Rocket System
MOA	Memorandum of Agreement
MOPP	Mission Oriented Protection Posture
MOS	Military Occupational Specialty
MPA	Military Personnel, Army
MPRA&L	Manpower, Reserve Affairs and Logistics
MPT	Manpower, Personnel, and Training
M&RA	Manpower and Reserve Affairs
MSE	Mobile Subscriber Equipment

MSRT	Mobile Subscriber Equipment Radio-Telephone Terminal
MTA	Military Testing Association
MTZ	Motorized

N

NATO	North Atlantic Treaty Organization
NAVSTAR	Navigation System
NBC	Nuclear, Biological and Chemical
NCO	Non-Commissioned Officer
NCOES	Non-Commissioned Officer Education System
NDI	Non-Developmental Item
NET	New Equipment Training
NG	National Guard
NGB	National Guard Bureau
NG/USAR	National Guard/U.S. Army Reserve
NLOS	Non-Line of Sight
NOE	Nap-of-the-Earth
NPRDC	Naval Personnel Research and Development Center
NPS	No Prior Service
NRS	New Recruit Survey
NTC	National Training Center
NTSC	Naval Training System Center

O

O&S	Operations and Support
OAC	Officer Advanced Course
OBC	Officer Basic Course
OCAR	Office of the Chief, Army Reserve
ODCSOPS	Office of the Deputy Chief of Staff for Military Operations and Plans
ODCSPER	Office of the Deputy Chief of Staff for Personnel
OLRDB	Officer Longitudinal Research Data Base
OMF	Officer Master File
OPFOR	Opposing Forces
OPT	Operations Planning Tool
OPTEMPO	Operational Tempo
OSBATS	Optimization of Simulation-Based Training Systems
OSD	Office of the Secretary of Defense
OS/UD	Organizational Structuring/Unit Design
OT	Operational Testing
OTE	Operational Test and Evaluation
OTJ	On-The-Job
OTEA	Operational Test and Evaluation Agency
OUSDRE	Office of Under Secretary of Defense for Research and Engineering
OWL	Operational Work Load
OWLKNEST	Operator Workload Knowledge-Based Expert System Tool

P

P-CON	Personnel Constraint Aid
PC	Personal Computer
P-COFT	Platoon Conduct-of-Fire Trainer
PCS	Permanent Change of Station
PDMT	Pilot Decision Making Training
PDOS	Professional Development of Officers Study
PER-SEVAL	Personnel System Evaluation
PIP	Product Improvement Program
PLATO	Programmed Logic for Automatic Teaching Operations
PLBS	Platoon Leader Battlefield System
PLL	Prescribed Load List
PM-LHX	Project Manager for Light Helicopter Experimental
PMS-AVENGER	Pedestal Mounted Stinger
PM TRADE	Project Manager Training Devices Evaluation
PNCOC	Primary Non-Commissioned Officer Course
POC	Platoon Operations Center
POI	Program(s) of Instruction
POL	Petroleum, Oil and Lubricants
POM	Program Objective Memorandum
POSNAV	Position Navigation
PRIME	Precision Range Integrated Maneuver Exercise

Q

QMS	Quartermaster School
QOL	Quality of Life

R

R&D	Research and Development
RADES	Realistic Air Defense Engagement System
RAM	Random Access Memory
RC	Reserve Components
RDBMS	Relational Data Base Management System
RDTE	Research, Development, Test and Evaluation
RF	Radio Frequency
RFAST	Revised Flight Aptitude Selection Test
ROTC	Reserve Officers' Training Corps
RPV	Remotely Piloted Vehicles
RSB-X	Recruiter Selection Battery-Experimental
RTS	Range Target System

S

S&T	Science and Technology
SAINT	Systems Analysis of Integrated Networks
SATS	Standard Army Training System
SBIR	Small Business Innovative Research
SCTB	Simulator Complexity Testbed

SDI	Strategic Defense Initiative
SDTD	Simulation Design Tool for Training Development
SECDEF	Secretary of Defense
SFAS	Special Forces Assessment and Selection
SFS	Synthetic Flight Simulator
SHORAD	Short-Range Air Defense
SIGINT	Signals Intelligence
SIMCAT	Simulated Combined Arms Training
SIMNET	Simulation Network
SIMNET-D	Simulation Network-Developmental
SINCGARS	Single Channel Ground and Airborne Radio System
SMART	Sales Marketing Advertising Recruiting Technology
SME	Subject Matter Expert
SMMP	System MANPRINT Management Plan
SOF	Special Operations Forces
SOP	Standing Operating Procedure
SORD	Systematic Organizational Design
SPARC	System Performance and Reliability Criterion
SQT	Skill Qualification Test
SRB	Selective Reenlistment Bonus
SSC	Soldier Support Center
SSC-NCR	Soldier Support Center-National Capital Region
SSRG	Special Selection Research Group
STARS	Sales Training for Army Recruiter Success
STINGRAY	Combat Protection System
STX	Simulated-Based Training Exercise

T

T-CON	Training Constraints Aid
T&E	Test and Evaluation
TAATS	Target Acquisition and Analysis Training System
TACFIRE	Tactical Fire Direction Center
TACOM	Tank Automotive Command
TACJAM	Tactical Jamming (Radio)
TAP	The Army Plan
TC	Tank Commander
TCMIS	TRADOC Command Management Information System
TDA/TOE	Table of Distribution and Allowances/Table of Organization and Equipment
TEAMS	Training of Electronic and Automotive Maintenance Skills
TEXCOM	TRADOC Test Experimentation Command
TOW	Tube-Launched, Optically-Sighted, Wire-Guided
TRAC-WSMR	TRADOC Analysis Center-White Sands Missile Range
TRACER	Triangulated Access to Coordinates at Extended Ranges
TRADOC	Training and Doctrine Command (as Proponent/User)
TRIO	Training for Radar Intercept Officers
TSG	The Surgeon General

U

UAV	Unattended Aerial Vehicle
UCOFT	Unit Conduct of Fire Trainer
UH-1	Utility Helicopter-1
UH-60	Utility Helicopter-60
USAARMC	U.S. Army Armor Center
USAADASCH	U.S. Army Air Defense Artillery School
USAAEB	U.S. Army Armor and Engineer Board
USAARL	U.S. Army Aeromedical Research Laboratory
USAARMC&S	U.S. Army Armor Center and School
USAAVNC	U.S. Army Aviation Center
USACATA	U.S. Army Combined Arms Training Activity
USACEB	U.S. Army Communications Electronics Board
USACFSC	U.S. Army Community and Family Support Center
USAES	U.S. Army Engineer School
USAFABD	U.S. Army Field Artillery Board
USAFAS	U.S. Army Field Artillery School
USAICS	U.S. Army Intelligence Center and School
USAIS	U.S. Army Infantry School
USAMRDC	U.S. Army Medical Research and Development Command
USAOC&S	U.S. Army Ordinance Center and School
USAPIC	U.S. Army Photo Interpretation Center
USAQMS	U.S. Army Quartermaster School
USAREC	U.S. Army Recruiting Command
USAREUR	U.S. Army Europe
USASC	U.S. Army Safety Center
USASC&FG	U.S. Army Signal Center and Fort Gordon
USASMA	U.S. Army Sergeants Major Academy
USASOC	U.S. Army Special Operations Command
USASWC	U.S. Army Special Warfare Center
USATB	U.S. Army Training Board
USMA	U.S. Military Academy

V

VCDD	Vehicle Crew Display Demonstrator
VCSA	Vice Chief of Staff, U.S. Army
VELVET	Video-Enhanced Learning and Video-Enhanced Training
VIGS	Videodisc Interactive Gunnery Simulator
$V(INT)^2$	Vehicle Integrated Intelligence

W

WFX	Warfighter Exercise
WIG	Workstation Interface Guidelines
WSMR	White Sands Missile Range

U.S. GOVERNMENT PRINTING OFFICE 1991 O—688-388